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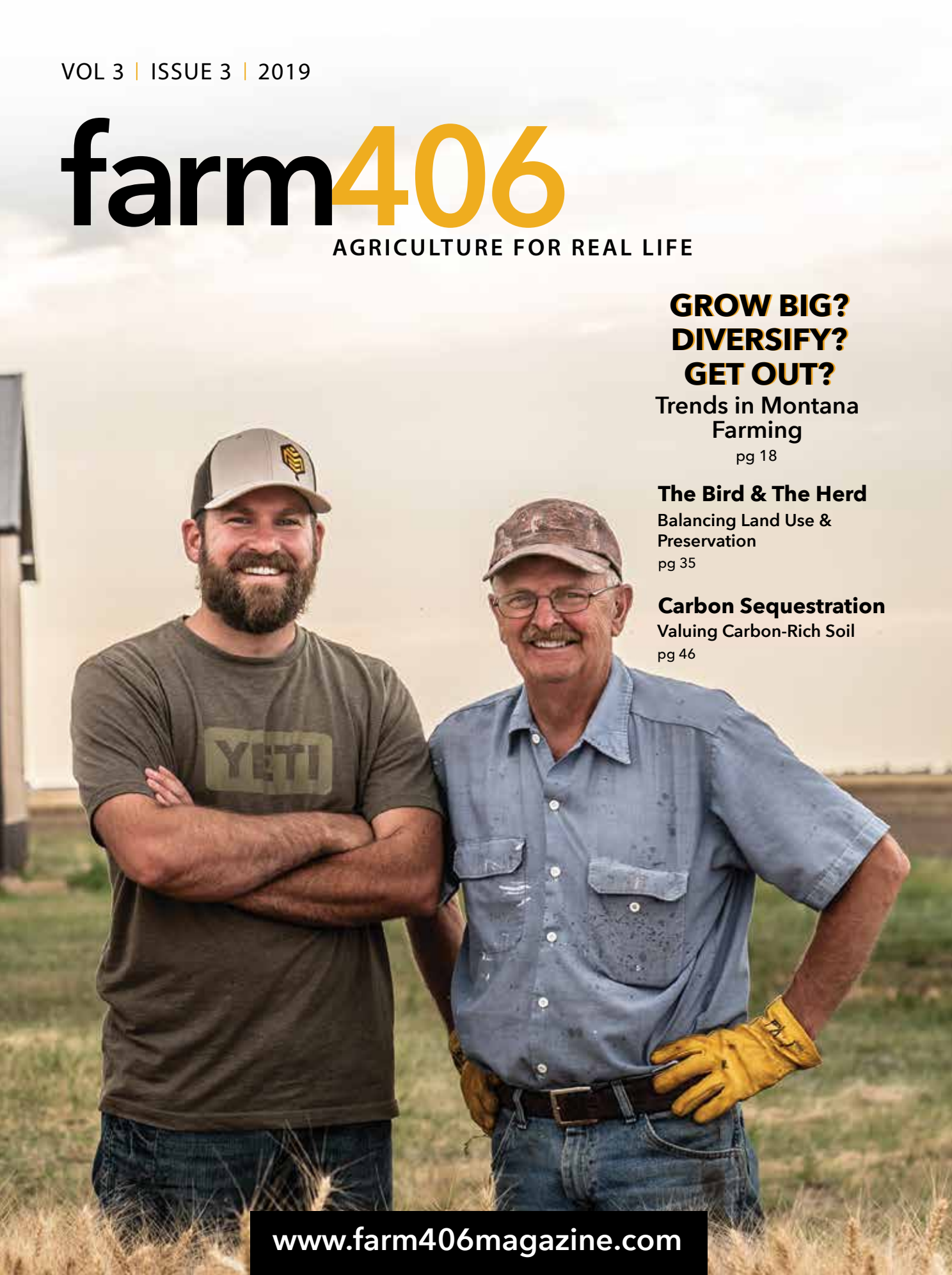

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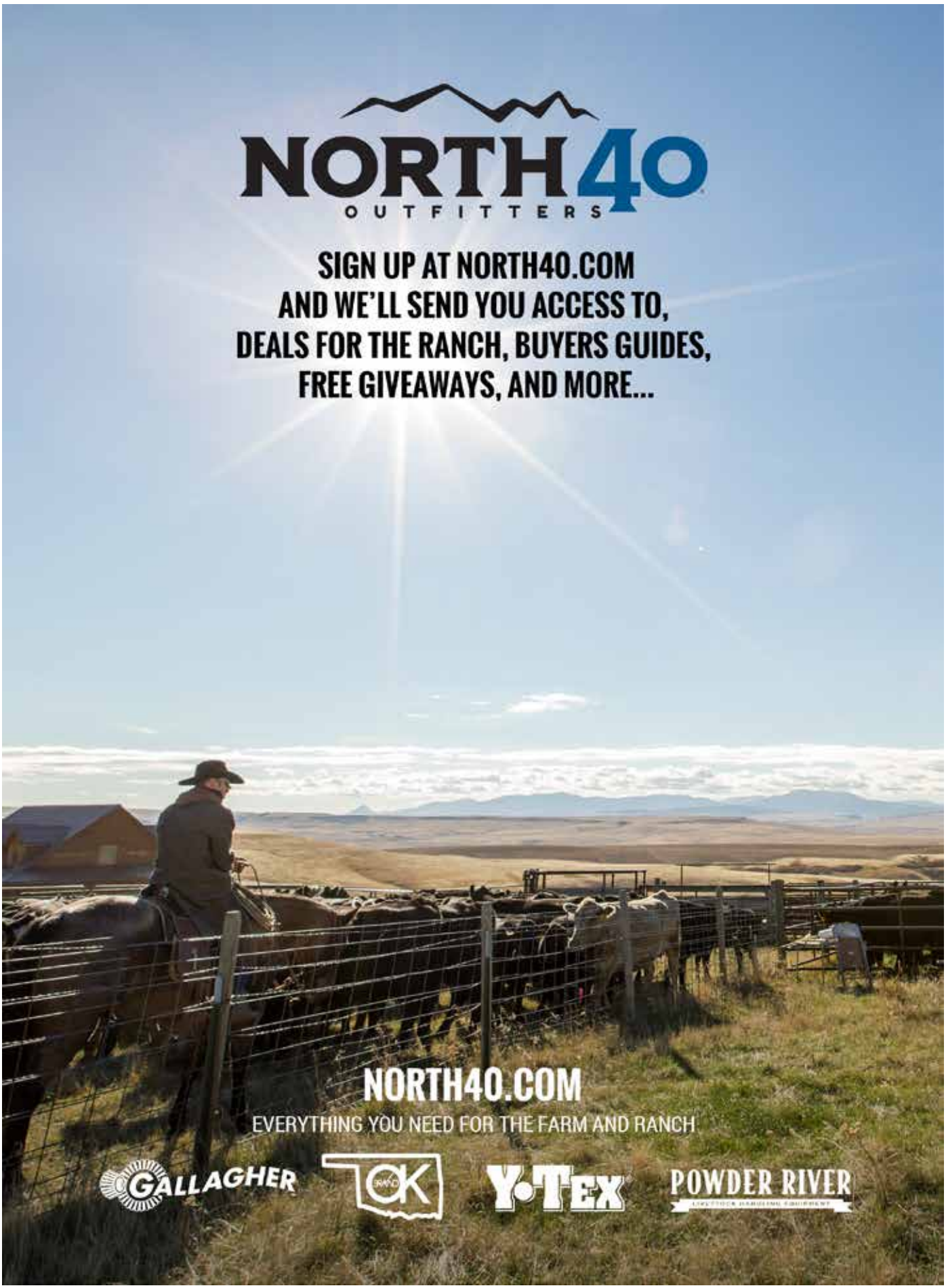
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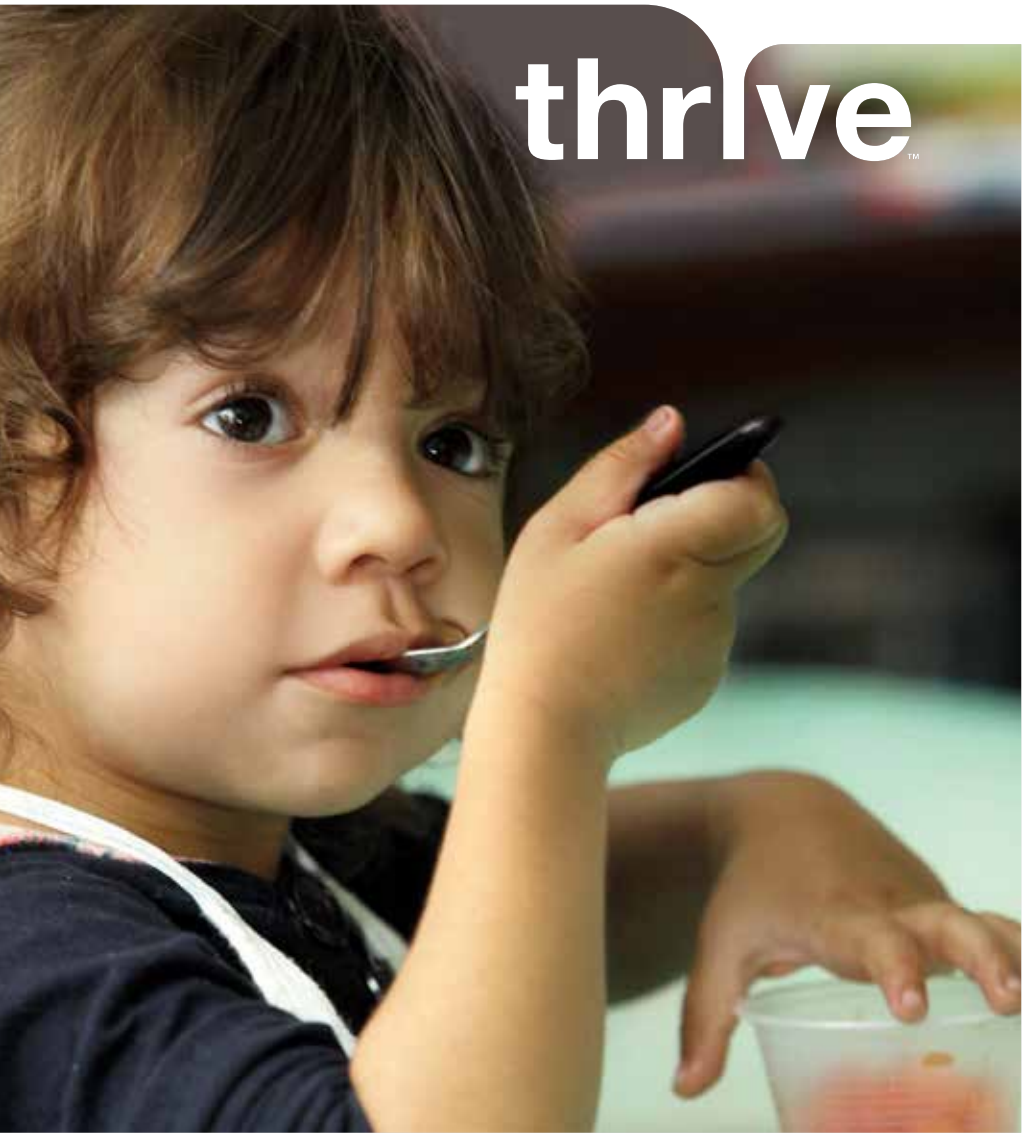

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In This Issue

Cover Photo:
Alexis Bonogofsky

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Photo By Alexis Bonogofsky

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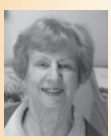

Having grown up on a farm that is still in the family, Suzanne Waring maintains an interest in advances being made in agriculture.

CULINARY SPECIALIST

Chandee Bomgardner is a Montana native with roots firmly planted in faith, family, farming and food. Her love for culinary arts is best witnessed in her art studio (commercial kitchen) where she creates new recipes and blends life into old family favorites. Chandee and her husband own Bomgardner Catering.

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AgriSync (update)

AgriSync enables farmers and advisors to connect and resolve support issues using a mobile video customer service platform. A recent major update created several new features. When a customer uses AgriSync's mobile call system, the call is simultaneously sent to a selected team of advisors with the new VoiceHub feature. While on a live call, an advisor can create a ticket in AgriSync with the Text to Join feature and invite the farmer to join a live video session by simply clicking a text. Using the Broadcast feature, users can create a simple broadcast message to share pro-active tips and reduce redundant support questions.

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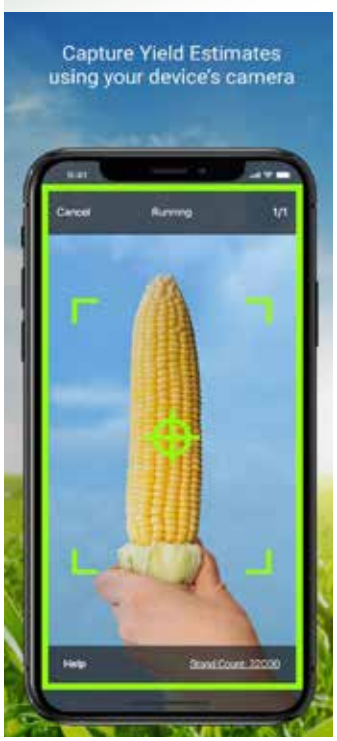
Pioneer Launches Corn Yield Estimator



The new Pioneer Corn Yield Estimator app uses machine learning, artificial intelligence and a little input from the user to fine-tune in-field corn crop measurement. Now available to farmers as part of the Pioneer mobile app, the Corn Yield Estimator takes a picture of the ear and instantly counts kernels on the ear. The yield estimator takes that count, the stand count and kernels per bushel to estimate yield for a field. Using a smart phone to do the kernel count means that a user can enter a field, strip down a representative sample of ears, do the

counts, include stand count and an estimate of kernels per bushel and more quickly estimate field performance.

The yield estimator walks the user through the process of lining up the ear of corn to be sampled, taking the necessary number of images and entering the remaining information before providing a yield estimate. The tool requires that husks and silks be removed before taking the picture, but the ear does not need to be pulled from the stalk.

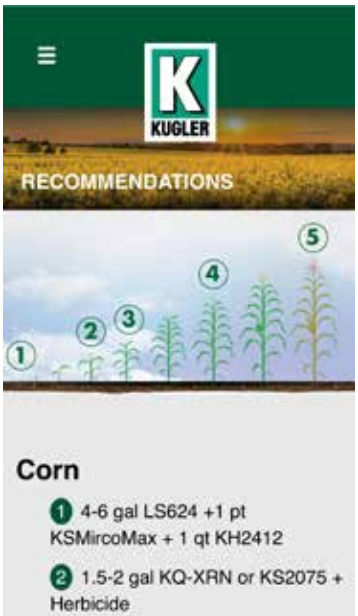
Available for iPhone, iPad and Android

All data has been gathered from a variety of sources and has not been independently verified, therefore it is provided for informational purposes only and is not guaranteed.

Kugler Timing App

The Kugler Timing App provides Fertilizer Application Timing and Product Recommendations on a wide variety of crops including corn, soybeans, wheat, sorghum, sunflower, barley, oats, peas/lentils, canola, and flax. To find the ideal Kugler product, along with the application rate and timing, simply select the crop from a list of 11 different options and select the growth stage based on an illustration that shows each stage of plant development from emergence through harvest. The app lists the most effective product(s) for that growth stage, along with the rate per acre.

Available for iPhone, iPad and Android



• OUTDOOR WIFI FOR THE FARM AND RANCH

Ayrstone Productivity® has introduced the AyrMesh® System of Wireless Farm Networking for the farm and ranch . The AyrMesh system is designed for easy set up and use by people with farm backgrounds. It uses standard WiFi signals and standard Ethernet connectivity, so it can connect a huge variety of household and industrial equipment. Simply connect an AyrMesh Hub to your home router, and mount it up high outside, clear of any obstructions. This allows you to bring WiFi, for your devices, outdoors in the farmyard up to half a mile away, or to connect buildings and other stationary farm equipment up to 2 miles away. By connecting additional AyrMesh Hubs, you can extend the WiFi signal much further away.

Unlike other outdoor WiFi products, the AyrMesh system is built for farmers, not networking technicians. All you have to do is connect each AyrMesh device to your network so it can download its configuration information from AyrMesh.com, and then mount it up high and out in the clear. The AyrMesh system is self-configuring and each device is monitored on AyrMesh.com, so you can tell at a glance that each device on your wifi data network is connected and working properly.

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For more information: www.ayrstone.com

• NEW AIR DRILL PROVIDES A FLEXIBLE, DURABLE AND PRODUCTIVE SOLUTION THAT MAXIMIZES TIME IN THE FIELD

Case IH is introducing the new Flex Hoe 900 air drill. Available in 50-, 60- and 70-foot tool bars with 10 or 12-inch spacing, this air drill features a new, intuitive user interface, so operators can make quick, on-the-go adjustments with ease. Designed with agronomic ground-engaging components, the Flex Hoe 900 features a short opener length, creating a true 1-to-1 ratio between the knife and press wheel. Additionally, a lower-weight design improves flotation and minimizes soil compaction. A Quick-Lock depth adjuster is ergonomically positioned at waist height and built with presets for easy, tool-free adjustments on each opener to accommodate changing terrain, eliminating the need for a wrench or any other tools.

To further assist producers in covering more acres in a day and transporting easily between fields, the Flex Hoe 900 offers an innovative fold-back design that transports smaller than competitive units. Available for the Model Year 2020 season.

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• WEED IT BETTER WITH THE NEW WEED-IT QUADRO WEED DETECTION AND ELIMINATION TECHNOLOGY

Effective weed detection and elimination is becoming increasingly important in today's growing environment with less precipitation, limitations on herbicides usage and resistant weeds. To help growers gain the advantage in weed management and control, WEED-IT manufacturers has introduced the WEED-IT Quadro: the next generation spot spraying.

The new WEED-IT Quadro incorporates 10 years of worldwide experience with the current WEEDit Ag system. Quadro refers to the four detection zones of every WEED-IT detection sensor, each accounting for 25 cm of the entire spray boom width. The extra small zones with improved optics make sure the system never misses any weed. Whereas this additional accuracy is easily missed by the human eye, the new blue LED-lighting is not. Blue LED's have proven to be more sensitive to weeds and less sensitive to background noise and thus more efficient compared to the red LED-lighting used to date. Blue is the new color of the next generation of spot spraying technology.

Adding to the increased accuracy and efficiency is the new dual core processor for fast communication and high sampling frequency. It guarantees higher communication speeds that would be needed to enable VRA, weed and biomass mapping and working with application maps in the future.

MSU Photo by Adrian Sanchez-Gonzalez

MSU Foundation Seed Program to Release Two New Winter Wheat Varieties

By Reagan Colyer

BOZEMAN – A pair of new winter wheat varieties soon to be released by Montana State University breeders are designed to help address two issues that plague wheat farmers across the state, sawflies and stripe rust fungus, while improving crop yields.

The Bobcat and Flathead varieties will be released this fall from the Montana Foundation Seed Program, according to veteran breeders Phil Bruckner and Jim Berg. The new varieties will be used to produce registered and certified seed through certified growers across Montana and should be available for purchase by the public between the 2020 and 2021 growing seasons. Two varieties released in 2018, Ray and Four0six, are now available for purchase statewide.

Bruckner and Berg have a combined six decades of wheat breeding expertise and have made thousands of crosses in their careers to address various characteristics of winter wheat, from maturation date to head size or resistance to a particular pest or disease.

Bobcat, they said, is the result of what the pair called a "nothing-special" kind of cross back in 2007, a blending of two solid-stemmed wheat varieties that had never been released on their own.

"There was nothing distinguished about the parents, but when they got exposed to sawfly, there were only two lines standing in the field: Warhorse and Bobcat," Bruckner said, referring to another MSU variety released in 2013.

Wheat stem sawflies bore into the stems of the wheat plant to lay their eggs, weakening the stem and often causing significant economic losses for wheat farmers. Solid-stemmed wheat varieties were developed to help combat this, though they trade insect resistance for yield, generally producing less than hollow-stemmed varieties. Increased sawfly resistance, along with yield improvement, is still a goal of many wheat breeding enterprises.

Bobcat stands out, Bruckner said, for having higher yields than Warhorse, which is the standard for sawfly resistance in Montana and the leading solid-stemmed variety in the state. "Of course, it's named Bobcat, so we have pretty high hopes for it," said Bruckner with a laugh. "We wouldn't name just any variety that. You only get one Bobcat."

Flathead, the second new variety soon to be released, is named for the area where it was developed. It was bred for resistance to a fungus that has caused serious problems for wheat growers in the area: stripe rust.

Stripe rust was never much of a concern in Montana until 2008, when an epidemic wiped out an entire line of MSU winter wheat called Genou. The area around Flathead Lake and near Kalispell often sees more stripe rust than other areas of the state, which is why Flathead wheat was developed there. Flathead comes from a cross between MSU's 2005 Yellowstone variety, known for its high yield potential, and a Washington State spring wheat that carried the two genes known to help combat stripe rust. Varieties with those two genes are impervious to all known types of stripe rust, Bruckner said.

Flathead also has the unique attribute of an earlier maturation date, a first for the MSU library of winter wheat varieties. The aim is to offer growers a catalog of seed that provides something for every need within Montana's 2 million acres of winter wheat planted each year.

"There's a lot of places in the state where early varieties are advantageous," said Berg. "Flathead has a combination of good yield, early maturity and shorter stature, and it makes a good loaf of bread, plus that stripe rust resistance."

While the variety is named for the Flathead Valley, Bruckner and Berg noted that it can be planted across the state, and since stripe rust is the most prevalent wheat rust in the Pacific Northwest region, it could fare well in surrounding states too.

Test fields of Bobcat and Flathead were harvested for Foundation Seed in late August by Dave Gettel, farm manager for MSU's Post Agronomy Farm. Having farmed for decades in north central Montana before working for MSU, he knows what to look for in winter wheat, and he was the first person to run the new varieties through a combine. True to its purpose, the Flathead matured about a week earlier than any other variety.

"Sometimes wheat will run out of moisture before it matures, so maturing earlier often means better kernel size and quality," said Gettel. "It threshed well and combined well, and it really finished better than the other varieties, with better test weight and better yield."

The Bobcat wheat took a few more days to be ready for threshing, and Gettel said he was pleasantly surprised. Solid-stemmed wheat can often be more challenging to thresh and put through a combine, since there is more fiber for the machine to break down. Gettel said Bobcat didn't pose the same problem.

"The Bobcat was within five bushels per acre of the Flathead in terms of yield, and it harvested pretty well," he said. "The fact that it's a better yielder than some of the previous sawfly-resistant varieties, plus the fact that it combines and threshes well, certainly makes it something I'd want to try if I was farming commercially."

Phil Bruckner, left, professor of plant sciences and plant pathology, and Jim Berg, research associate in the winter wheat breeding program at Montana State University, have bred two new varieties of winter wheat, which will be in commercial use by 2020.MSU Photo by Adrian Sanchez-Gonzalez

Bruckner and Berg said a huge amount of support helps their team continue to work on new crosses for Montana wheat farmers.

"The Cereal Quality Lab, regional testing at nine different sites, funding from the Montana Wheat and Barley Committee and all the producers who support our program," Berg said. "We're all in this together, and their commitment has allowed us to do what we do."

Contact: Doug Holen, douglas.holen@montana.edu, 406-994-5687

MSU Photo by Adrian Sanchez-Gonzalez

Montana State University's College of Agriculture faculty David Weaver observes wheat variations for wheat stem sawfly cutting at a study plot near Amsterdam, Montana. Weaver and associate professor Carl Yeoman are co-authors in a wheat stem sawfly genome study, researching the microbial ecology of the invasive pest.

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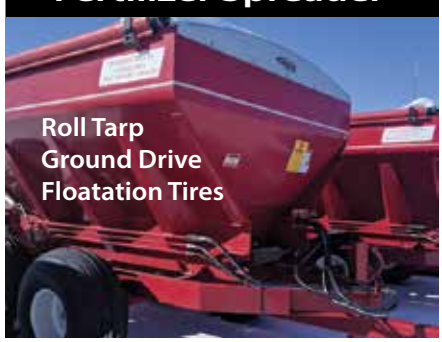

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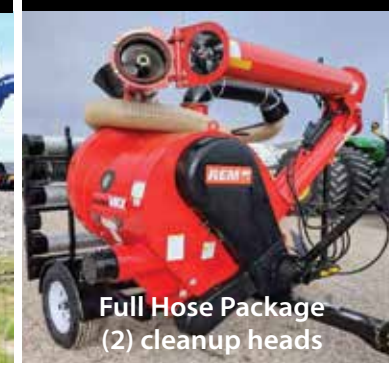

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“I’m pretty sure my dad had dirt in his blood.”

Phil Steinberger (left) and his son Drew Steinberger (right) are working to diversify the income stream on their mid-sized farm located just east of Forsyth, Montana.

The Hollowing Out of the Mid-sized Farm:
What One Farm Family in Forsyth is Doing to Turn the Tide

BY ALEXIS BONOGOFSKY • PHOTOGRAPHY BY ALEXIS BONOGOFSKY

When I pull up to Phil Steinberger's farm just four miles east of Forsyth, Montana, in mid-July, the sun is just starting to peek up over the horizon, illuminating his wheat fields and the bright red barn that Phil and his wife Renee turned into a guest house.

When I called him earlier in the week to set up a time for a visit, I told him that I'd be driving a beat-up Subaru Forester.

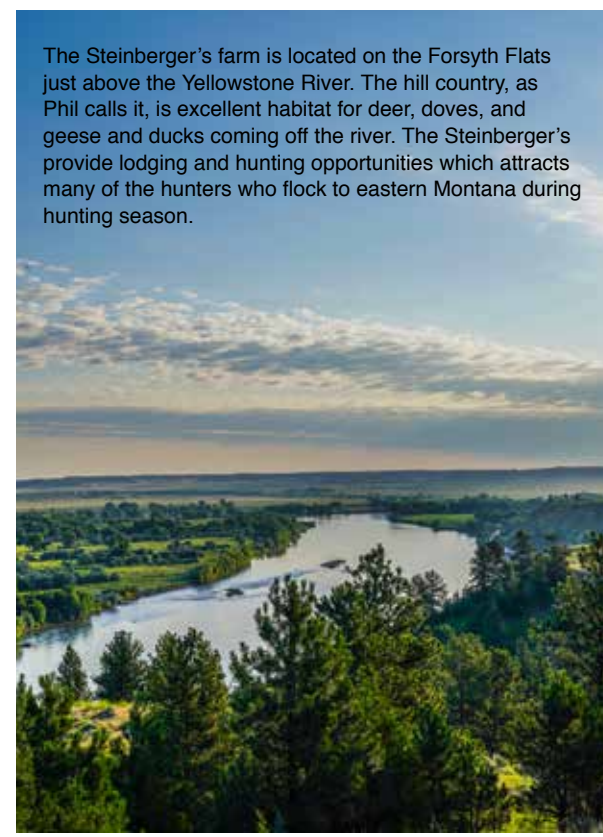
"Well," he said, "you'll fit in real nice around here."

I step out of my car and Steinberger hands me a mug full of hot coffee.

"Ready to go for a drive?"

I hop in his pickup with my camera and he gives me a tour of his 525 acre dryland wheat farm located on the Forsyth Flats, a Pleistocene era (colloquially known as the last Ice Age) terrace that spreads out 200 feet above the Yellowstone River. You can see the majestic Castle Butte to the north and the Rosebud Buttes to the southeast.

Steinberger, who has spent a majority of his life in Forsyth but grew up on a generational North Dakota diversified farm near Minot, bought the farm from Larry Erpelding in 2002. He knew it would be a tough go to make it work but farming was in his blood.



The Steinberger's farm is located on the Forsyth Flats just above the Yellowstone River. The hill country, as Phil calls it, is excellent habitat for deer, doves, and geese and ducks coming off the river. The Steinberger's provide lodging and hunting opportunities which attracts many of the hunters who flock to eastern Montana during hunting season.

Phil and his wife Renee have restored the old barn on the property for vacation and hunting rental. The red barn can sleep up to 12 people and has meeting space in the upstairs. There is also another renovated house on the property that can sleep up to 9 people. They also have RV hook ups.

"I'm pretty sure my dad had dirt in his blood," Phil jokes as we bounced down the two track along his wheat fields.

"The question I've always asked myself: how do you make this size of farm work?" he said. "I keep my costs low and I make it work, but long-term, what does a successful farm here look like when you don't have the resources to get bigger? How do I pass it down to my kid so he can continue farming?"

Steinberger continued, "Larry said it best, 'What we need are people who love the land, look at the land and see what is needed to live on the land.'

The hollowing out of the mid-sized farm

The mid-sized farm, defined by the USDA as a farm that earns between $50,000 - $500,000 in farm sales per year is in decline. Margins on commodity production are small and so the choice that faced mid-sized farmers in the past was either to get big or get out. Agricultural experts call it the hollowing out of the mid-sized farm.

The 2017 USDA census confirmed a couple of dominant trends in agriculture. The first trend involves large conventional farms growing bigger and adopting technologies and practices that make them more efficient and require less on-farm labor.

The less visible trend is that in order to make it, other operations – usually smaller ones like the Steinberger's – are diversifying into new products and services, such as ecotourism, niche food products, vacation rentals, and hunting and fishing opportunities, in order to offset low commodity prices.

Drew checks his bee hives that he keeps on his family's farm. He sells honey directly to consumers and plans to increase the number of hives in the coming years.

In Montana, the census showed that farm income dropped nearly 30 percent from 2012 to 2017 but it also showed that nearly 300 farms generated over $9 million dollars last year by further manufacturing or processing raw products. Producers also took more interest in specialty crops. Since 2012, Montana added over 160 new orchards and increased hops production from nearly 0 to 1,400 pounds.

We might still be in the get-big-or-get-out era but mid-sized farms may have another choice: diversify-or-get-out.

Thinking inside the bee box

As we drove by his wheat fields, summer fallow fields, alfalfa plots for hay, and a new tri-blend cover crop he is experimenting with, we stop to wander around and look out over what Phil calls their "hill country," rough breaks with pine trees, sage and prairie flowers that eventually drop into the Yellowstone River floodplain.

The hill country is excellent habitat for deer, geese and ducks coming off the river, and doves. These hills, and the habitat they provide, are one part of the Steinberger's efforts to diversify their farm income. People from all over the country come to their farm to hunt and to stay in their two guest houses that they have renovated for this purpose, and they even have RV hook--ups. They named their business PR Country Comforts which stands for Phil and Renee.

Drew shows his daughter Kinsley a brood frame. A bee brood refers to the eggs, larvae and pupae of honeybees. Each frame which is mainly occupied by brood is called a brood frame. This was Kinsley's first time in a bee suit.

"My wife and I renovated the old red barn, we call it Larry's Barn, and we've tried to make the farm an ideal location for people to come and hunt, have family reunions and gatherings, and even some weddings." Phil told me, "We've got people staying here year round."

Then Phil points out the dozens of bee hives on the edges of the farmed fields. Almost right on cue, his son Drew arrives with his bee boxes stacked in the back of his pickup.

Bees crawl around on an unfilled frame that Drew added to the hive.

Drew and Phil try to look at the farm as a place of opportunity: what can they can do to bring in more income with the resources they have on site and make family succession possible?

One of Phil's wheat fields lights up behind a grain bin at sunset in July.

Drew fills mason jars full of honey from recently harvested frames. The honey this year is a light gold. The color and flavor of honeys differ depending on the nectar source (the blossoms) visited by the honey bees.

"My son, you know," Phil says as he slaps Drew on the back, "he thinks outside the box."

But really, Drew is thinking inside the box: the bee box.

What first started as a work project in 2015 through his day job with North 40 Outfitters in Great Falls has turned into a larger scale honey-making, beekeeping operation in Forsyth. It's small enough that he can manage the business from Great Falls with frequent trips back to the farm on the weekends, but large enough to make it profitable.

"I started learning about beekeeping at North 40 when we started selling beekeeping equipment," Drew told me. "We need to have an understanding of the product we were selling. Previous to that, I had zero experience. A local beekeeper helped me out and of course, YouTube videos."

In 2016, Drew and his wife Brooke, bought two hives and kept them in their backyard in Great Falls. By the winter of 2018, he decided to take the plunge and get bigger.

Phil drives me around his farm explaining the challenges and opportunities for a farm his size.

"I started to look at it as a viable sideline business for the farm, thinking down the road a bit. I have 70 hives now, the goal is to have 100 by the end of the season so they can go to California for the winter."

He convinced me to suit up so I could help him and his eight-year-old daughter, Kinsley, add boxes and frames to the hives. It's was also Kinsley's first time helping. Her initial nervousness at all the bees buzzing around faded as she started helping her dad place new boxes on the stacks.

"Dad look! Look at their legs!" Kinsely points to the bright yellow pollen on the legs of the bees returning to the hive.

Drew and Phil try to look at the farm as a place of opportunity: what can they can do to bring in more income with the resources they have on site and make family succession possible?

Drew holds up a filled frame of honey in the sunlight.

"Bee season doesn't conflict too much with farming, which doesn't conflict with the guest house and hunting season. The overlaps are minimal. All three operations are part of the succession plan. The three combined can be a sufficient source of income," Drew told me as he harvested some of honey and poured it into mason jars.

They are always keeping their eyes open for something else to try on the farm.

"If there is another cycle or another opportunity to explore then we'll try it," Drew tells me as he shows me a test plot of hops he started this year, "I'll test things out, see if they work here, and then scale up if they do."

If you are interested in learning more, head over to www.prcountrycomforts.com or Drew's blog www.406farmer.com.

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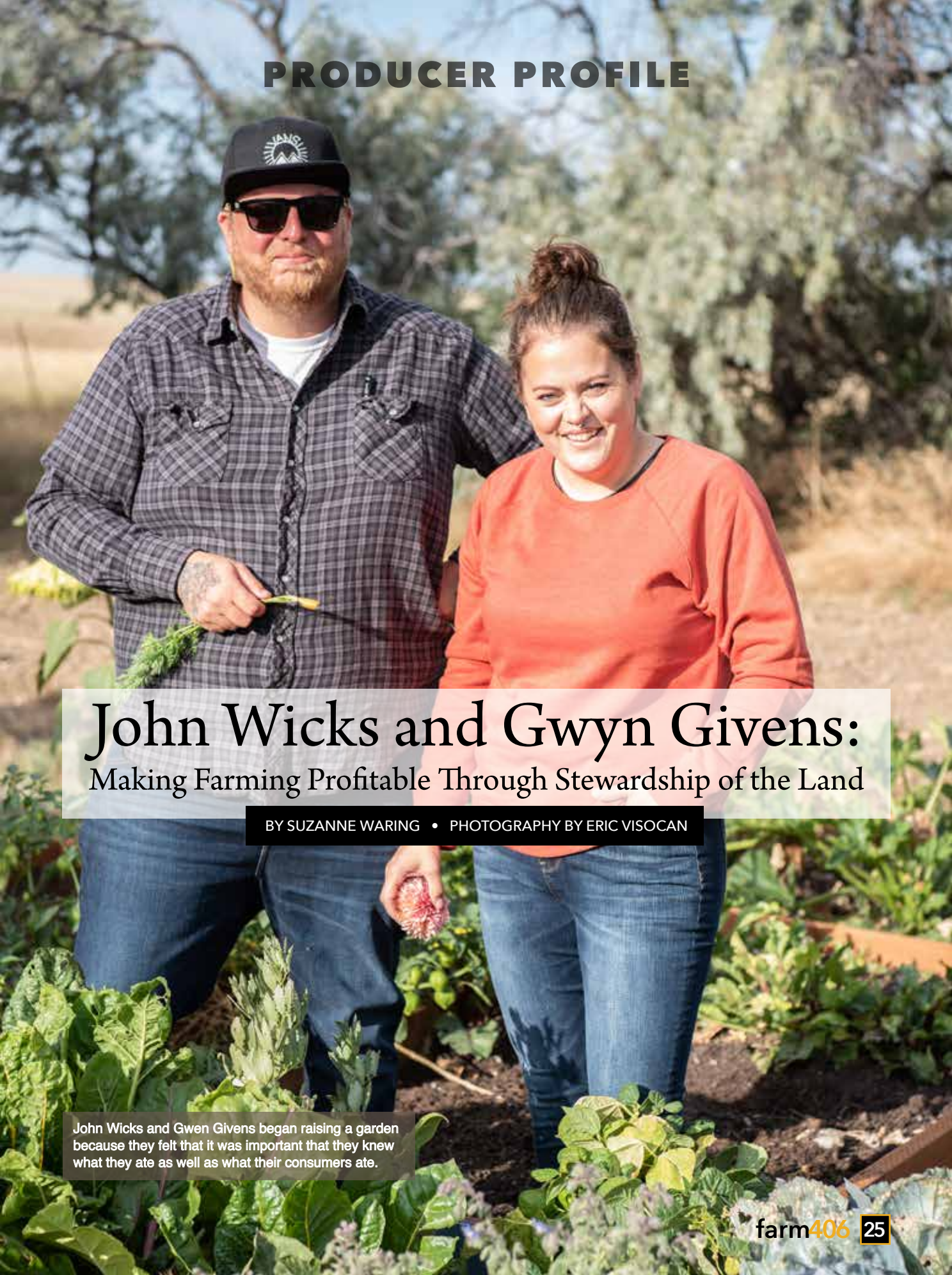


John Wicks and Gwyn Givens:

Making Farming Profitable Through Stewardship of the Land

BY SUZANNE WARING • PHOTOGRAPHY BY ERIC VISOCAN

John Wicks and Gwen Givens began raising a garden because they felt that it was important that they knew what they ate as well as what their consumers ate.

The 21st Century story of North Central Montana's agriculture will include a lengthy chapter on organic farming and techniques developed for the stewardship of the land. John Wicks of Ledger will be one of the foremost voices when that story is told.

Wicks checks organic malt barley to determine how close the grain is to harvest.

Wicks, 34, grew up in North Central Montana and Southern Saskatchewan because his father farmed in both places, but John finally landed permanently in Montana and graduated from Chester High School. He learned welding and machining at the Helena College of the University of Montana and then decided to go to Montana State University to study agriculture. During his first year, his father passed away. Being the only son, Wicks moved home and started farming.

"I have wonderful neighbors," said Wicks. "When they saw me doing something inefficiently, they would stop along the road and teach me on the spot by showing me how. I was definitely on the learning curve."

Wicks slid into the cycle of farming seasons starting in 2006. He worked the family farm and followed in his father's footsteps by farming conventionally, but over time he saw that the bottom line was a big problem. "We were just getting killed following the big AG production model. We could have great yields and super clean fields, but it just wasn't a profitable business model for our family farm," said Wicks. During this period, he found that he was highly susceptible to getting sick during seeding. Finally, he realized that he was contracting chemical pneumonia from the synthetic fertilizer.

In 2012 Wicks began attending meetings where he learned about progressive farming methods and spent considerable time reading, especially about soil regenerative practices and microbiology. He started adding cover crops to his farming rotation schedule.

In 2016 when he had 1280 acres coming out of CRP, he decided to try the organic route. Figures after harvest told him that he had made a good decision, so he is gradually moving all of his tillable land to organic. Not having to purchase fertilizer and pesticides has been a big savings, but he needed the cover crops to control the weeds and build up the soil. Feeling that he was at the controls, Wicks became excited about farming.

Wicks inspects brown millet in his six-way cover crop mix.

For a warm season cover crop, Wicks orders sorghum-Sudan grass for the biomass, taproot, and feed value; pearl millet for feed, for breaking up disease pathogens, and for growth in poor soil; and red clover, because it is a legume and will fix atmospheric nitrogen. Tillage radish is added because it captures nutrients and helps to break up compaction in the soil. Sunflowers are part of the mix because their long taproots help with water infiltration rates. Wicks mixes this seed at the seed facility and may later add seed varieties he has on hand.

When a field has a warm season cover crop, cattle graze on the mix and then it winterkills. The first year of grazing experience showed that the calves were a hundred pounds heavier than in normal years.

The next spring, a cash crop is planted. If it is lentils, then winter wheat is planted in early fall after the lentils have been harvested. After wheat harvest, the cool season cover crop is planted.

Givens makes homemade salsa.

As one environmental supportive measure, he has created a pollinator strip around his fields of western needle grass, green needle grass, slender wheatgrass, Lewis Flax, Maximilian Sunflower and alfalfa for butterflies, bees, and other insects.

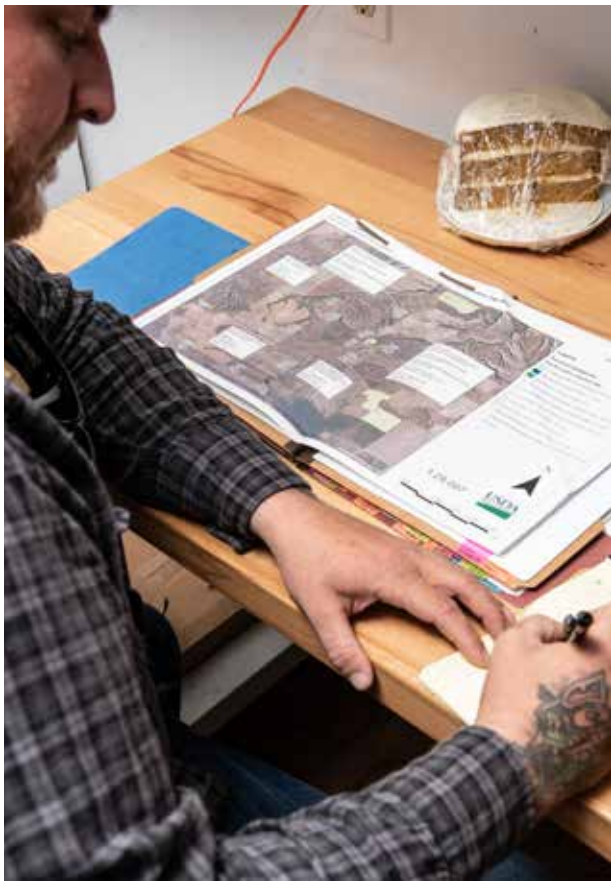
The cool season cover crop mix contains triticale for its height and biomass to suppress weeds, Austrian winter peas for nitrogen fixation, and hairy vetch for its nitrogen fixation. This mix will winter over and grow into the spring, competing with weeds until it is time to seed the warm season cover crop. The cool season mix cover crop is disked or better yet crimped with a large blade roller to break the stalks and to leave a weed barrier mulch.

Wicks' two crop cycles are 1) warm season cover crop, lentils, winter wheat, and then cool season cover crop or 2) warm season cover crop during one season, spring cash crop the next season, and then cool season cover crop.

As these cover crops create biomass, they build organic matter over time which also helps to keep the soil like a sponge

Gwen Givens picks green beans

The Wicks started raising their own chickens last spring and are now enjoying eggs from free-range hens.



Wicks is making a checklist for his 2020 equipment conservation plan.

and increases water-holding capacity. Each percent of organic matter built equates to about 10-20 units of nitrogen. "My soils now are 1.5-2.3 percent. In homestead days this area was probably 5- 6 percent," said Wicks. "I'm convinced that if cover crops were more highly utilized, chemical and fertilizer inputs would be reduced; stewardship of the land would be moved to a new high; climate change would be reduced; and in the end, the farmer would have greater profits from cash crops."

The whole point is to build soil health by sequestering as much carbon to feed all the microbes and life in the soil, which, in turn, gives the plants what they need. It is a simple idea with a complicated science behind it. Building mycorrhizal fungi is the key to making those nutrients available to the plants.

In a growing season, 65 percent of Wicks' farm is in crop production, and 35 percent is resting with a cover crop. "The cost reduction to my total operating note dropped around 25 percent by shifting inputs from conventional practices to regenerative," said Wicks.

Wicks has worked directly with Timeless Seeds at Ulm since he has taken up organic farming and has contracted lentils and chickpeas with the company.

As Wicks developed his farming beliefs, his wife, Gwyn Givens, a Big Sandy native, who had studied at the culinary school at Johnson-Wales University in Denver to become a chef, became an active part of his team. Gwyn suggested they make changes so that more of their food would come from the farm. They have planted a garden for five seasons, and they have started raising chickens. They have dreams of creating an orchard and raising a few pigs. Wicks wants to raise the ancient wheat, Black Winter Emmer or a rare variety of Emmer, which is almost extinct. Because the seed is so expensive, he has a plot of it where he will harvest the seed to save for planting next year. As this process is repeated, his seed supply will become large enough to plant a field of this grain.

Gwyn and John have a joke about the progress that he has made in his farming by using an analogy from Gwyn's culinary background. Before he started farming organically and using cover crops to build up the soil and reduce weeds, he was just a cook following the recipe big Ag prescribed by spraying and fertilizing at their recommended rates. When he started learning about these alternate methods, he became a chef and created his own recipe for a farm in a particular location and with certain attributes.

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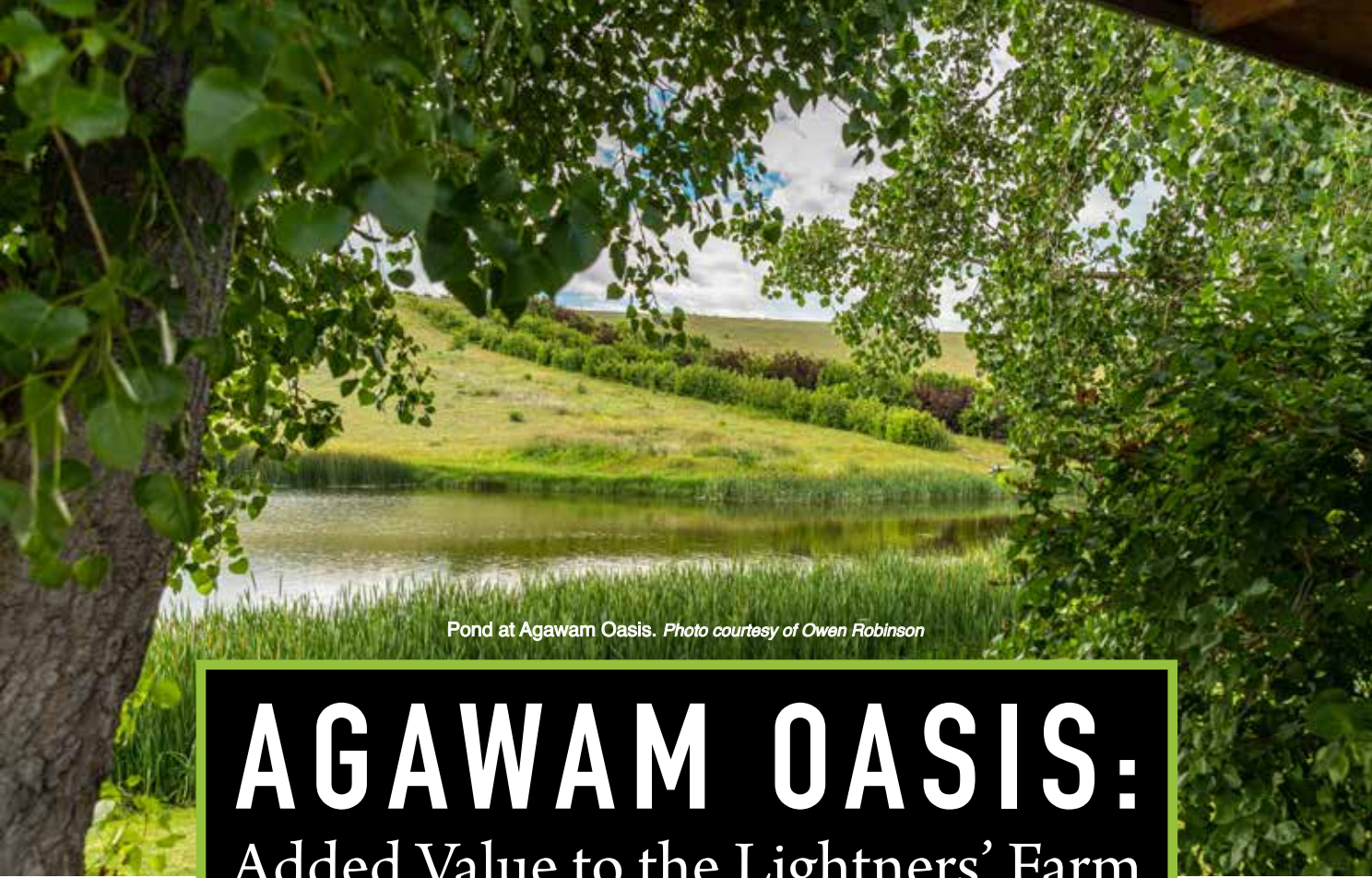


Pond at Agawam Oasis. *Photo courtesy of Owen Robinson*

AGAWAM OASIS:
Added Value to the Lightners' Farm

By Suzanne Waring

Montana farmers continually search for creative ideas for adding value to their farming operations. Many think that such applications might be their salvation during those rough years. Some farmers choose to bypass brokers and sell their products directly to purchasers; many develop new byproducts , such as creating a coffee alternative made from barley; others use their expertise and equipment to do custom work for other farmers. Tom Lightner and his brothers, Kevin and Jim, who farm north of Choteau have been contemplating renting out a family recreational area on their farm for special events. Now they aren't so sure that this idea is feasible because of an unexpected premature cost.

The Lightners' farm has a spring that has never gone dry during the three generations they have lived there. It was their father, Raymond, who had the dream of damming up the spring to create a pond for both irrigation and recreational purposes. This was done in the spring of 1995, two years before Raymond passed away. "He was able to see the pond and participate in construction of a storage building at what we began to call the Agawam Oasis," said Tom Lightner.

The word Agawam was taken from the name of the former town located below a hill on the farm's south side. The town with a post office until 1956 was named by a Milwaukee Railroad official after Agawam, Massachusetts.

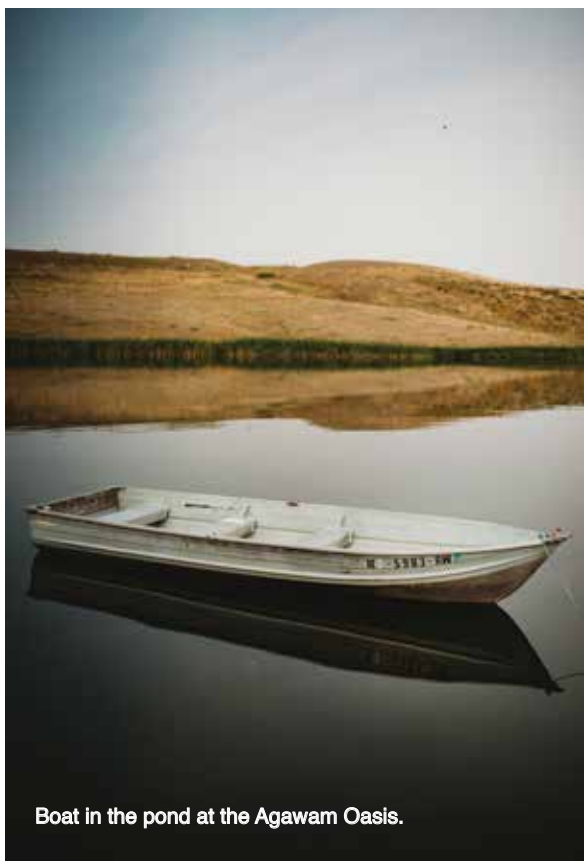
For the Lightner family, the abundance of water and verdant environment at Agawam Oasis created a relaxing atmosphere, especially during the late summer when the contrast to the nearby dry, brown hillsides was striking.

Photo by Suzanne Waring

Attendees of farm tour enjoying the Agawam Oasis.

Evening shot of shelter house bar at the Agawam Oasis.

Photo courtesy of Rachel Lightner



Boat in the pond at the Agawam Oasis.

Photo courtesy of Rachel Lightner

Over the years the family has improved the area by changing the contour of the land around the pond, planting grass (three times) that produced a well-manicured parklike atmosphere, and completing the shelter house that includes bar, tables and chairs. Wiring, providing electricity for the oasis, was laboriously buried for a half mile from the nearest power line. Coolers have been added. The grass now has to be watered and mowed frequently during the summer; the flowers, weeded; the shelter house, cleaned regularly; the facility, opened and closed each season; and the pond, stocked with fish for anglers' pleasure. "Every year we think of something we would like to add to make Agawam Oasis nicer," said Lightner.

As of this date the Lightners have rented the Agawam Oasis only three times: once to Cargill for a retreat, once for a neighbor's wedding, and this summer to the Great Falls Chamber of Commerce as part of a farm tour. They also held their own son's wedding there recently. If the Lightners wanted to really work at it, this eye-catching retreat could possibly be value added to their farming business, but, so far, the Agawam Oasis has not shown that it would be a money maker. In fact, it has been costly.

"As adults, our kids seem to be leaving the farm. We thought perhaps if we kept them involved in the Oasis as they grew up and continued to improve it that one—or more—of our kids would become interested in making it a real business venture and stay in the area," said Lightner.

Recently the Lightners received an updated property assessment which was outrageously higher than previous assessments. The Agawam Oasis is now being assessed as a commercial business when, so far, the Lightners haven't even made a concerted effort to set up a schedule for renting the facility. They are still at the stage of determining whether it is worth renting out the family retreat. What they received for the three rentals hasn't begun to cover the cost of mowing, watering, and maintaining the property. All three rentals were done as a favor to those who knew about the facility.

The Lightners are aware that many other value-added ventures are taxed when there is a net income, but in this situation, it appears that they will be taxed on the improvement to their property regardless of whether any income is generated.

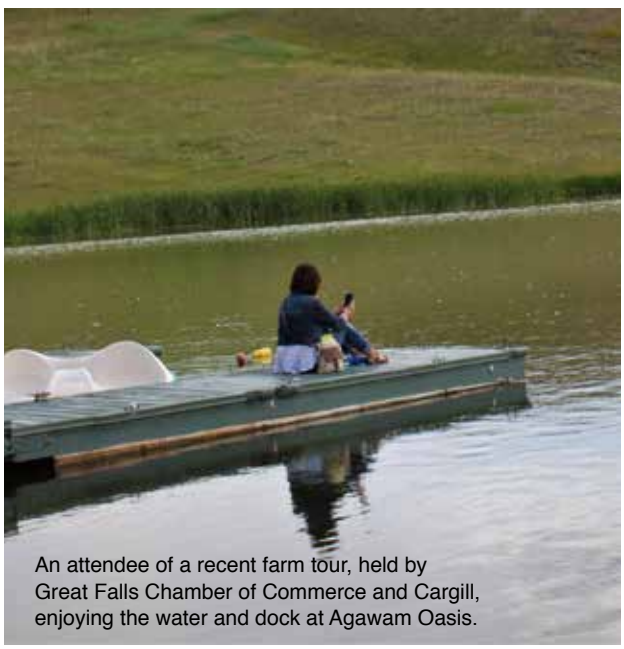
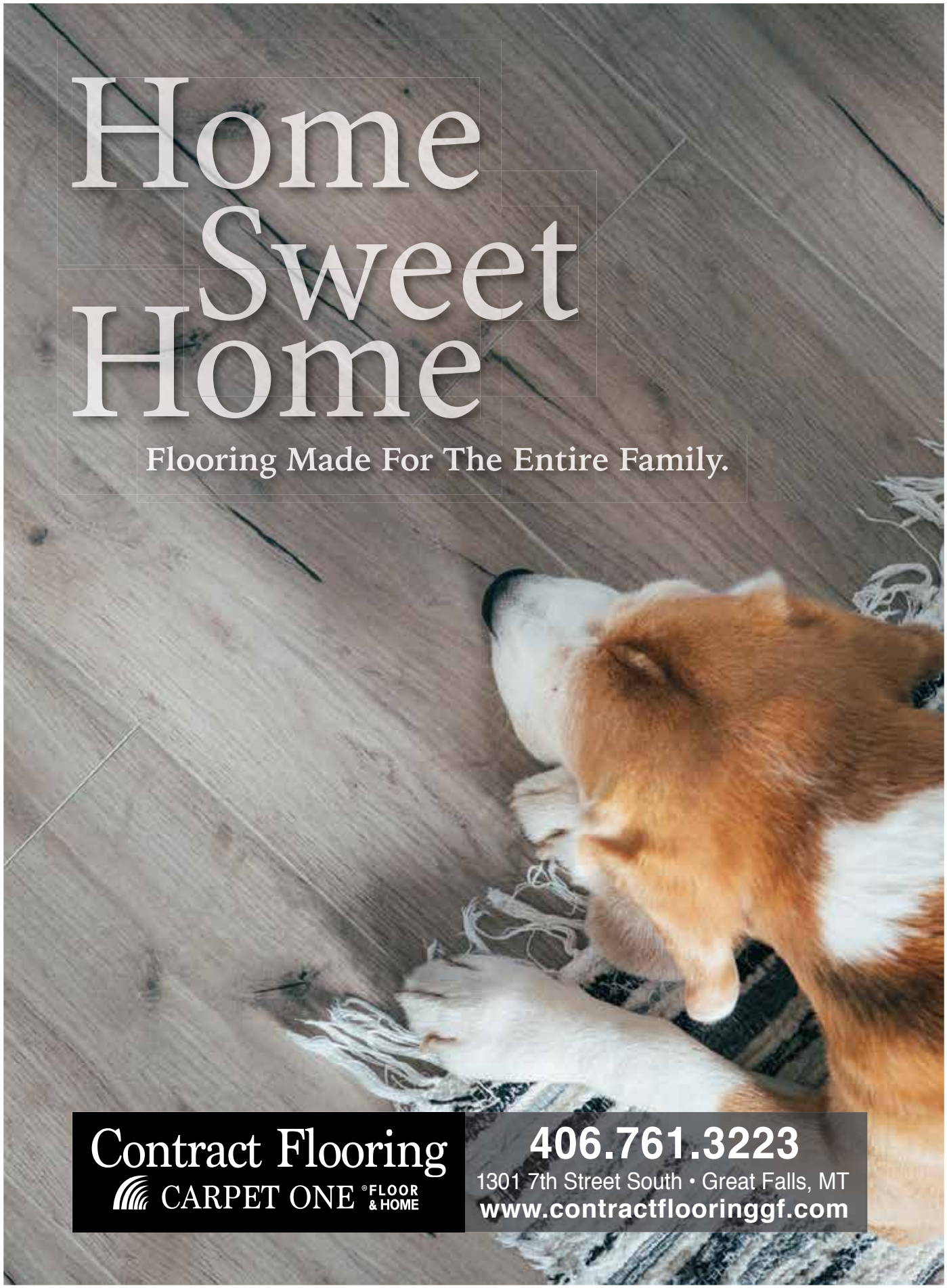


Photo by Suzanne Waring

An attendee of a recent farm tour, held by Great Falls Chamber of Commerce and Cargill, enjoying the water and dock at Agawam Oasis.

Property taxes in our counties pay for schools, health departments, emergency and fire services, and roads, to name a few departments that depend on property taxes. "We recognize and support that, but the Agawam Oasis has not had a chance to become a business and should not be considered commercial until such time that it is fully established," said Lightner.

As of press time, Tom Lightner will be discussing this issue with the assessor, and he possibly will be appealing the assessment with the appeal board. Somewhere in this dilemma a balance will be worked out, or farmers, like the Lightners, will hesitate about using energy, time, and money to improve their property with a business venture in mind. Adding value to a farm is a win-win situation. With added traffic into a community, each business venture can impact more than the one enterprise.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The Bird and The Herd

By John Grassy

Sage grouse mating. *Photo, Nappadol Paothong, Columbus, MO.*

L to R: Kim and Brett Lesh with Rebecca Knapp on the Cross-W Ranch, Ekalaka, MT. *Photo, Eliza Wiley, Helena, MT.*

In the spring of 2012, Bret Lesh was trying to figure out water on the new 9,000-acre unit of his Cross W Ranch. Along with every other rancher in Carter County, Montana, his business was subject to the yearly calculus of snow, rain, temperature and wind. In a good year, his native rangeland in spring released its bounty of western wheatgrass, blue grama, thickspike wheatgrass, forbs and buffalograss, a carpet of bright green amidst the blue-gray sagebrush. Snowmelt and rain filled the small reservoirs and excavated pits that served as water sources for his cows. Sage-grouse assembled on their ancestral breeding grounds, the males to strut and joust for the attentions of nonchalant females. But that was a good year, that was maybe three years out of five. Bret Lesh needed to figure out water on his new property because a successful rancher in southern Carter County never loses sight of what can happen to his land and livelihood during the other two years.

Recently-hatched sage-grouse chicks. *Photo, Nappadol Paothong, Columbus, MO.*

When he stopped into the USDA Natural Resource Conservation Service (NRCS) office in Ekalaka that spring, Bret Lesh had no doubt heard the talk around Carter County about the greater sage-grouse. The big prairie birds that held dramatic courtship rites and flushed in coveys – the mottled grayish-brown-and-white birds everyone in Carter County saw most any normal day and scarcely considered, except when they fed along the roads and posed a threat to collide with passing vehicles – were declining across much of their historic range. Wildlife biologists were in southern Carter County studying the birds. State and federal agencies were huddling to discuss conservation strategies. It was entirely possible in 2012 that the Greater Sage-Grouse could be listed as a federally threatened or endangered species. The sage-grouse scientists had given southern Carter County a new name: Core Area 13. "Core" referred to the relative quality and importance of the habitat for Sage-Grouse in Montana; it meant the healthiest, most intact habitat, with a stable population of birds.

Rebecca Knapp, the NRCS district conservationist in Ekalaka, welcomed Bret Lesh into her office for their meeting. In response to the growing concern over sage grouse, her agency, a year earlier, had launched the National Sage Grouse Initiative, a cost-share program for private landowners who committed to making improvements on their land or changes in their management regimes to benefit sage grouse, an umbrella species for 350 other sagebrush-dependent birds, mammals and other wildlife. In Carter County, Knapp says, agency staff and local leaders had decided on a low-key approach to the initiative. Sage-grouse were plentiful, which meant they were successfully coexisting with local ranching practices. The talk of a federal listing for the bird already had some landowners worried. "We decided to proceed slowly and limit local publicity," Knapp says. "We wanted to see how it went in some other areas first."

The water problem Bret Lesh hoped to solve was as old as the history of ranching in southern Carter County, where a dependable source of clean, healthful water is hard to come by for people and livestock alike. The county sits atop the Pierre Shale geologic formation, which contains water of poor quality and limited quantity. Beneath the Pierre Shale there's ample water of good quality in the Lakota formation, but a well has to go 1,700 to 3,000 feet to reach it.

Early ranchers found a solution in digging shallow pits to capture snowmelt and rain for their animals. "It's not as easy as it sounds," Knapp says of the practice. "You have to find the right type of soil and you need a drainage that's large enough to supply each pit." With several pits developed across his property, a rancher could usually acquire enough water to get his herd through the summer. Ranchers in the county still

make use of pits today, but a fundamental drawback remains: the water supply dictates where and when cows can graze. "If you rely on water from reservoirs or pits, you have to utilize that water when it's there," Bret says. "If they fill, you're alright until early fall – most of the time."

And when it's a bad year, one of those two years out of five – when spring rain is scarce and it's 94 degrees for five days in a row in late May with the wind blowing, and the pits and reservoirs become mudholes – that is when a rancher in southern Carter County may end up with only one water source to get him through until fall. He'll move his cows into the pasture adjoining that water source. The herd gets to work eating the grass, then eats it some more. Three miles away he may have a pasture loaded with grass, but he can't put his cows there because the water supply has dried up. So the cows stay in the pasture with water. The grasses become weak from repeated grazing, their root systems lose vigor, and the stage is set for soil erosion. After that, it may take just one major rain event to get the process started. Even if there's no erosion, the grasses in that pasture will be hard-pressed to survive, and won't produce as much forage the following year.

Rebecca Knapp Natural Resource Conservation Service (NRCS), District Conservationist, Ekalaka, MT, Carter County. *Photo, Eliza Wiley, Helena, MT.*

Wyoming Sagebrush plant. Sage grouse like this type of sagebrush because there is enough height, cover, and protection from predators to raise their chicks.

Scattered across Carter County, with its erodible, clay-based soils, are the scars of erosion that started this way. Most of the damage is historic, meaning it occurred 70 to 100 years ago, but Knapp says there's recent damage too. In a climate that receives 14 inches of precipitation per year, returning damaged rangeland to full health can take 20 years. Bret Lesh knew all about this process. There were some badly eroded areas on his new ranch unit and he didn't want history to repeat itself.

"Bret had all this grass and very little opportunity to use it efficiently," says Knapp. "Maybe he could run twice as many cows if he had the water and the ability to manage where they were grazing. He was pretty frustrated."

Bret described for Rebecca a possible solution for his water problem. He wanted to use one of the existing shallow wells as the water source for a network of pipelines and stock tanks. The tanks would be deployed across the 9,000-acre property such that every pasture had its own source of fresh water. With these improvements, he could escape his dependency on seasonal water; with additional cross-fencing, he could rotate his herd through different pastures, controlling the timing and duration of grazing. Once he had the system fine-tuned, he might even be able to rest an entire pasture or two until the following year.

Rebecca Knapp and Jalyn Klauzer, NRCS Sage Grouse Initiative Wildlife and Rangeland Conservationist, viewing a sage brush steppe in southern Carter County. *Photo, Eliza Wiley, Helena, MT.*

The NRCS offered a cost-share program called EQIP, which stands for Environmental Quality Incentives Program. Bret Lesh was familiar with EQIP and asked Knapp about it. At that time, Carter County already had a sizable number of EQIP applications in the works and Knapp understood his chances of getting funded wouldn't be very good. Instead, she decided to discuss the program no one had yet discussed. "I mentioned that there was a national initiative focused around sage-grouse conservation," she says. "I asked if he might be interested in having his application evaluated in the Sage-Grouse Initiative funding pool. And to my surprise, he agreed."

The rancher saw an opportunity to improve his cattle operation; the conservationist saw an opportunity to secure and improve prime sage-grouse habitat on private land, where 64 percent of all sage-grouse live in Montana. Bret made application for the cost-share agreement. Soon after, Knapp and her team went to work on a field assessment of his property.

It turns out that one of the time-honored formulas for surviving as a rancher in Carter County happens to be equally beneficial for the life cycle of sage-grouse. It's an unscientific rule of thumb for stewardship of the native rangeland and insurance against bad years: take half, leave half.

Walk through a section of Bret Lesh's rangeland in mid-May, when the new grass is coming up, and the bright green growth is obscured by a foot-high cover of residual grass. This is the half of last year's crop that Bret left ungrazed. The grasses and other plants were able to store up nutrients and strengthen their root systems before going dormant. A plant that has been grazed will spend the final weeks of the growing season expending nutrients to rebuild itself. Its crown will be less insulated and more susceptible to winterkill. If the next spring should arrive dry and hot, it may not produce as much forage. Ranchers like old grass for their cows in spring, as the

Melissa Foster, Wildlife Biologist, Montana Fish Wildlife & Parks, Baker, MT. Photographer, Eliza Wiley, Helena, MT.

mixture of old and new offers a good balance of protein and dry matter. With its reserve of vegetation, a rested pasture is money in the bank.

After holding their courtship rituals in early spring, hen sage-grouse disperse one to four miles from their breeding leks to nest. Residual standing grass provides valuable hiding and thermal cover for hens incubating their eggs, and later for the newly-hatched chicks, of which only one third will survive to adulthood. Residual grass produces shade, another important element for the young birds; it also supports lots of insects, a critical food source for growing chicks.

Melissa Foster is a wildlife biologist with the Montana Department of Fish, Wildlife & Parks. In 2009, Foster led a four-year study of sage-grouse in Core Area 13. Researchers captured 94 hens, fitted them with radio collars and logged their movements throughout the seasons. Foster's research produced a wealth of data that Rebecca Knapp used as she worked with Bret Lesh on the conservation plan for his ranch. Sage-grouse continue to do well in Carter County in part because ranchers manage their lands for the long-term, says Foster.

"We have a lot of really well-established families. They've been through droughts, they know they have to care for the land," Foster says. "I hear over and over from ranchers in the area – they say they've got to leave grass. It's a wonderful ethic."

Healthy grass is something all ranchers and conservationists can agree on. Sagebrush is a more difficult topic. Most producers value sagebrush for the cover and winter feed it provides and for the diversity it adds to the landscape, but they want to see a balance of sagebrush and grass. In some areas, sagebrush reaches a density that negatively impacts the understory of grasses and forbs. The species here is Wyoming Big Sagebrush; Core Area 13 represents the eastern extent of its range. Soil and climatic conditions produce a smaller, more compact version of the shrub than exists in other regions. It blankets tens of thousands of acres in a gray-blue mosaic. Sage-grouse are the only species of wildlife able to feed exclusively on sagebrush leaves. During the growing season, the birds consume insects, flowers, buds, and forbs, along with sagebrush; during winter, they survive on sagebrush and not much else.

One significant finding in Foster's study involved the impacts of grazing cows on sage-grouse nesting success. It was believed that hens would experience a lower success rate nesting in a pasture with cows moving around. Foster's research found nest success was actually higher (59%) in pastures with active grazing than in pastures without livestock (38%). "It wasn't a statistically strong result and it could be a nonfactor," says Foster, "but it definitely showed that livestock grazing is compatible with conservation."

Mesic area on the Cross-W Ranch, Ekalaka, MT. *Photo, Eliza Wiley, Helena, MT.*

The reasons for the potential difference aren't known. Foster suggested it could be the result of behavioral avoidance of cows by predators. Regardless of the reasons, it wasn't long before that scientific observation, along with the findings about the value of leaving residual cover, evolved into a rallying cry for conservationists: What's good for the herd is good for the bird. Good rangeland management practices, like leaving residual cover and controlling grazing duration – benefit the rancher while maintaining the habitat sage-grouse need.

The conservation plan for the Cross W Ranch evolved from Bret's needs, the resource inventory developed by Knapp and her team, and Melissa Foster's study, which mapped the various habitat types used by sage-grouse during the year. For Bret and his wife, Kim, the first priority was addressing the lack of reliable water. Their conservation objectives included improving plant density and overall forage production, decreasing soil erosion, and maintaining and enhancing habitat for sage-grouse, mule deer, and antelope. Knapp's team conducted rangeland and riparian health assessments and cover transects to compare the existing plant communities with their potential for a particular site. The quality and quantity of wildlife habitat was evaluated and rated. Foster's data was used to map winter, breeding, nesting, and brood-rearing habitat for sage-grouse on the property; it also showed how the birds tended to move around the area, which proved helpful for Knapp and her team in deciding where to locate new cross-fencing.

There were a few areas with significant erosion that occurred 100 years ago, when first sheep, and later cows, were concentrated in creek bottoms to access water. The plan called for removing 5.5 miles of woven mesh fencing, another relic of the sheep ranching era, a type of fencing considered a hazard for sage-grouse and other wildlife. The old fencing was replaced with four-strand barbed wire outfitted with reflectors, each about the size of a playing card. Reflectors help reduce sage-grouse collisions with fences; four-strand fencing enables large wildlife like pronghorn antelope to slide underneath the bottom strand on their bellies, avoiding injury.

Bret's new property included several mesic areas, which are vital to the growth and development of sage-grouse chicks. These are places where the ground remains wet or moist year-round. In late summer, when uplands habitats are baked dry, hens lead their chicks to mesic sites, which are shaded, significantly cooler, and harbor lots of insects. The young birds are growing rapidly at this point and they feed heavily on beetles, ants, caterpillars and other invertebrates. The placement of stock tanks and the grazing plan were aimed at

reducing grazing pressure on mesic areas to create more and higher-quality habitat.

Knapp collaborated with state and federal land management agencies on the engineering and route of the water pipelines, while Bret selected most of the sites for the 15 water tanks. They laid out new pastures, each with its own tank, and designed cross-fencing to make each pasture a separate unit. The grazing plan Knapp developed was simple by design, based on the concept of 'take half, leave half,' rotating season of use, and limiting the duration of grazing to 45 days or less. Each pasture would receive 13 months of rest, and Bret would be able to start the year grazing a different pasture than he started in the year before.

After working with the new program for three years, Bret says Knapp deserves credit for preaching the benefits of rotation grazing systems that utilize rest or lengthy deferment periods.

"It works," he says. "It flat works. If it doesn't rain, I can guarantee you rest-rotation programs work better. When you can stay out of native pasture and let it make seed before your cows go in there, it just makes everything so much better. And letting the plants grow and build their root systems, they can withstand a lot more hot and dry." With better access to water and improved grass production, Bret estimates his yearling cows will gain an additional 30 to 50 pounds each during the growing season. And the other sagebrush-associated wildlife has taken notice, too. "Antelope and mule deer were nonexistent on the place when I took it over," Bret says. "Now I'll see 200 to 300 antelope during their migration, and a lot of mule deer."

Fence reflector to deter sage grouse from colliding into a wire fence.

The partnership with Rebecca Knapp, the Carter County Conservation District and the NRCS was entirely positive, says Bret – so positive that he entered into a second agreement for a conservation and grazing program on another section of his ranch. "I guess I was the poster child,"

Sage grouse hens grazing alongside a bull at an Oregon ranch. *Photo courtesy of the USDA NRCS.*

he says. "I don't know that I had any reservations. I had a few concerns that I voiced about how big of an anchor are you going to tie around my neck in terms of what I can and can't do. I quickly found out that wasn't the case at all."

After Knapp's team installed the warning reflectors on Bret's fencing, one local guy teased him, asking, "you teaching those birds how to read?" But it wasn't long before curiosity turned to interest. Since that day in 2012 when Bret Lesh went to see her, 21 landowners in Carter County have sat down with Rebecca Knapp and entered into cost-share agreements for Sage Grouse Initiative projects. In February of 2019, the Society for Rangeland Management presented Rebecca with its Rangeland Management Specialist of the Year award, a national honor, and the highest in her profession. Knapp says the Sage Grouse Initiative "opened the door for landscape-level conservation planning and implementation across southern Carter County.

"I think over the years we've built a good working relationship with people on the land," says Knapp, who has lived in Carter County since 1994. "Long-lasting conservation is inspired and driven by the producers. A project starts out with a connection – a conversation, a visit to the ranch – and ends as a series of improvements that span generations."

The surge in conservation work for sage-grouse that began around 2010, when the bird was petitioned for federal listing as a threatened or endangered species, continues in the 11 western states with sage-grouse populations. The federal agency charged with making a determination on the birds' status, the U.S. Fish & Wildlife Service, concluded in 2015 it would not list the sage-grouse, opting instead to give state-level conservation programs time to work. In 2020, the Service is planning to conduct a status review "to assess whether our collective efforts to conserve sage-grouse are moving in the right direction," according to its Web site. Following that review, the issue of listing the sage-grouse may or may not resurface.

While the conservation challenges differ from one state to the next, southern Carter County offers as good a model as any for the elements needed to conserve the species. First and foremost, sage-grouse require a lot of territory. "They use a big landscape," says Melissa Foster. "Some of our hens had really small home ranges, while others made seasonal movements of up to 30 miles between summer and winter ranges." In other states, studies have documented migrations spanning 100 miles. When bird numbers decline on breeding leks, it may be due to impacts such as new roads, dwellings, power lines, or conversion of sagebrush grasslands to crop fields many miles away.

This is the second major challenge: the greater sage-grouse cannot abide human activities. Biologists have found bird numbers dwindle in areas where a new oil rig, cellphone tower, or wind turbine goes up within five miles of a breeding lek. In these situations, the birds don't necessarily move away. Foster says they lack "behavioral plasticity," the ability to consider moving to a new place. Instead, their numbers slowly decline over time. Northwest of Baker, Mont., in a region of heavy energy development, "there are still a handful of leks where male sage-grouse dance conspicuously next to pump jacks or main roads. I can't tell you how many times I've been told they're living proof that oilfield development doesn't bother sage-grouse," Foster says, "but when you look at lek counts for that area, there's a long-term downward trend."

The National Sage Grouse Initiative administered by the USDA Natural Resource Conservation Service is one of many conservation efforts across the West. Montana has a state conservation program launched in 2013. Local and national nonprofit land trusts work directly with private landowners on conservation easements, which limit development and protect sagebrush landscapes, often on a permanent basis. Federal land-management agencies such as the Bureau of Land Management and US Forest Service have implemented rules for oil and gas development and other land-use activities in sage-grouse country. For now, the greater sage-grouse population appears relatively stable. But there is still more work to be done.

New USDA-APHIS Identification

By Megan Van Emon

There are new rules regarding beef cattle identification beginning on January 1, 2020. The new rules transition the use of metal tags to radio frequency identification (RFID) tags. The goal of the transition is to improve traceability of livestock in case of disease outbreaks.

Beginning January 1, 2023, beef and dairy cattle and bison that move across state lines or that fall into specific categories will require RFID tags. Currently, feeder cattle and other animals that move directly to slaughter will not require the RFID tags.

Beef cattle required to have RFID tags include sexually intact and 18 months or older; used for rodeo or recreational events (regardless of age); or used for shows or exhibitions. The tags should be applied at birth or when the animal moves off ranch in interstate commerce.

Low- or ultra-high frequency tags may be used depending on the preference of the producer, state, or industry. Tags need to be approved by the USDA, tamper proof, a unique ID, and display the official US ear tag shield. The RFID tags can be part of a matched set with the visual ID. RFID tags will also be available to replace the metal, orange brucellosis tags.

There will be an increased cost in utilizing the RFID tags. The USDA will work with individual state animal health officials to share the cost of the RFID tags. Additionally, state partners and the USDA will aid in the funding of electronic readers for veterinarians and other markets.

A premises ID number will be required to buy official RFID tags. Individual states will be responsible for approving and allocating the discounted tags and managing the process. Veterinarians can continue to inventory and apply the official ID tags, but they must maintain the record keeping requirements. A list of approved RFID tag manufacturers will be maintained by the USDA. Veterinarians and producers may purchase the RFID tags directly from the manufacturer or retailer.

Tattoos and brands may continue to be accepted as an official ID, if the shipping and receiving state both agree to accept the markings in place of an RFID tag.

Timeline of Implementation of RFID Tags

December 21, 2019: USDA will stop providing the free metal tags. Approved metal tag vendors may still produce official metal tags for one year. These tags will be available to purchase from approved vendors on a state-by-state basis, as approved by an authorized state animal health official through December 31, 2020.

January 1, 2021: Metal ear tag production with the official USDA shield will no longer be permitted by the USDA. Veterinarians and producers cannot apply metal ear tags for official ID and must use the official RFID tags only.

January 1, 2023: RFID tags will be required for beef and dairy cattle and bison moving across state lines and meeting the requirements. Animals previously tagged with metal ear tags must be retagged with official RFID tags to move interstate. Feeder cattle and animals moving directly to slaughter are not subject to the RFID requirements.

RANCHING FOR CARBON:

Montana Ranchers Pilot Carbon Credit Program on Rangeland

BY ALEXIS BONOGOFSKY • PHOTOGRAPHY BY ALEXIS BONOGOFSKY

Betsy Indrelund and I step into a side-by-side and take a drive through a pasture that she and her husband Roger have been rehabilitating on their cattle ranch just north of Big Timber. The sweet clover is so tall it is whipping through my hair and bees are buzzing everywhere. We can barely see where we are going.

"We are letting this pasture rest for a bit; it was a little beat up," Betsy said as she pointed out different ways they are moving the cattle through the landscape to help improve the soil.

Roger drives behind us in the pickup with his dog Lily. We stop so he can measure the soil temperature and test the amount of sugar in the grass and sweet clover. Roger explains that the sugar levels in the plant are similar to a gauge of photosynthetic activity and overall health of the plant: the higher the sugar levels, the healthier the plant. This is where Roger starts to geek out on soil health.

Roger Indrelund describes how managing their ranch for soil health has allowed them to increase their stocking rate by 30% without needing to purchase or lease additional land.

Betsy Indreland talks about the importance of plant diversity to soil health in their seed shed where they keep over 50 varieties of seeds.

Roger Indreland tests soil temperatures in a pasture. By keeping a record of soil conditions he can track the progress they are making.

"Sugar levels in a plant are measured as Brix," he says, squeezing the juice out of some sweet clover into a refractometer, which is the tool he uses to measure sugar levels. "It's a quick way to determine the health of the plant."

Roger quickly jots the data down in a small notebook he carries in his pack to keep track of what he's measuring over time.

The Indrelunds have been working to improve soil health on their ranch for years, but this year they took it a step further and became one of four Montana ranches to join a pilot program called the Montana Improved Grazing Project, the first of its kind in the United States. The program pays ranchers to adopt soil health and conservation practices that pull carbon (CO_2) out of the air and store it in the soil.

The benefits go far beyond just capturing carbon and providing another source of income for ranchers in tough market conditions. Ranchers benefit from the increased productivity of the land. More forage means ranchers don't have to buy as much hay. Healthier, more resilient grasslands that retain more moisture mean they can increase stock density.

"We've increased our stocking rate by 30 percent since we've started improving our soil," Indreland said. "That's not nothin'."

Continued on page 51

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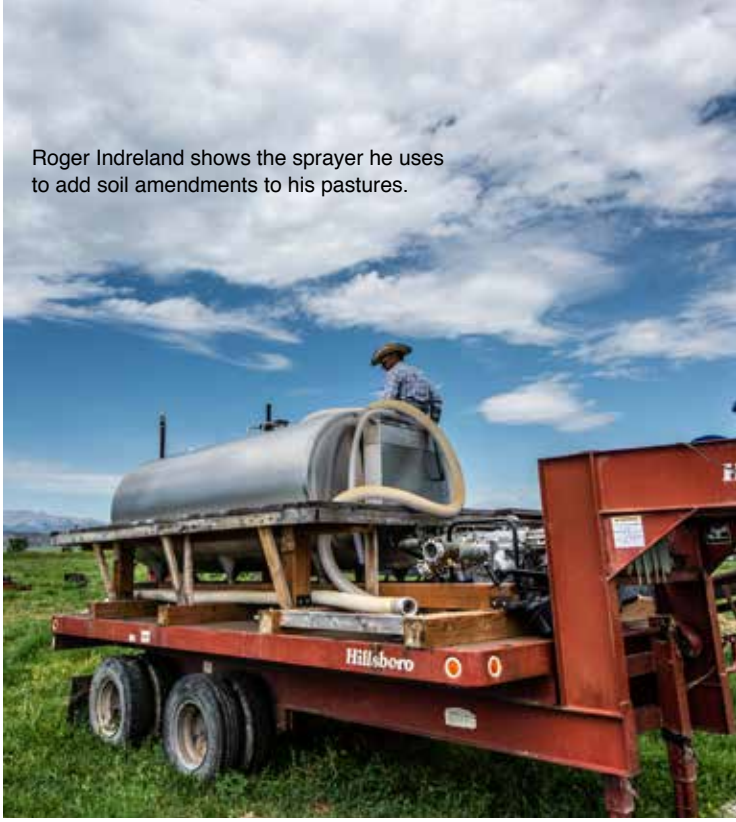
Montana Improved Grazing Project

The Montana Improved Grazing Project was conceived five years ago by Native Energy, a national Vermont-based carbon offset organization, and Western Sustainability Exchange (WSE), a Montana non-profit that works with ranchers to improve management practices on their land to improve soil health.

"Native Energy approached us because of our leadership in intensive grazing management, soil health monitoring, and cell grazing as well as our network of producers. They proposed that we do a commercial validation study where we would see if a carbon market for livestock producers in Montana was viable," Chris Mehus, Ranching Program Director for WSE told me. "We looked at 50 different sites at about ten operations throughout the region. We found that by improving grazing practices we could capture carbon and keep it there."

Through the project, three things are projected to happen: CO_2 will be sequestered in the ground, soil health will improve making rangelands more productive, and participating ranchers will have another source of income.

According to the 2017 Montana Climate Assessment, the state of Montana will continue to warm in all geographic locations, seasons, and under all modeled global emission



Roger Indreland shows the sprayer he uses to add soil amendments to his pastures.

Roger and Betsy Indreland are one of the first ranches to enroll in Western Sustainability Exchange's Montana Improved Grazing Project, the first of its kind in the United States.

A honey bee lands on a sweet clover plant on the Indreland Ranch.

scenarios, throughout the 21st century. By mid-century and end-of-century, respectively, Montana temperatures are projected to increase by roughly 4.5-6.0°F and 5.6-9.8°F, depending on emission scenarios. These projected temperature increases are larger than the average changes projected globally and nationally. Montana is expected to have drier, hotter, summers which could mean less grass and more stressed landscapes.

Combined with the fact that many businesses around the U.S. are worried about their impact on climate emissions and are looking for ways to reduce their carbon footprint as much as possible, Montana ranchers may have opportunities to diversify their income and increase the productivity and resiliency of their land. Some of these companies, like Ben and Jerry's, ClifBar, eBay, Patgonia, Disney and many others, turn to Native Energy, a national non-profit, which sells them carbon credits. Those carbon credits are used to pay someone else, in this case, Montana ranchers, to take carbon out of the atmosphere and store it in the ground.

According to the Natural Resources Conservation Service (NRCS), approximately 70 percent of Montana is made up of rangeland and pastureland which makes them Montana's largest natural resource. In Montana alone, there are more than 40 million acres of privately-owned grazing lands. Because of the large area, these lands have the potential to sequester a significant amount of additional carbon from the atmosphere. Recent research indicates that grasslands may be even more effective than forests at sequestering carbon.

"We see this as an investment in producers to accelerate the transition to better grazing practices," Mehus said. "If we can incentivize higher stocking densities on pastures, shorter grazing periods, longer rest periods, it's going to equate to healthier and more plants which will mean more roots in the soil which leads to more carbon sequestered."

Properly managed rangelands of the United States are estimated to have the capacity to store 19 million metric tons of CO2 per year. Therefore, rangelands can have a major impact in mitigating the effects of elevated atmospheric carbon dioxide levels on global climate change.

In the pilot stage of the program, ranchers sign a 30-year contract with Native Energy and agree to implement science-based, sustainable management practices; in particular, they turn to high-intensity, rapid rotational grazing, cover cropping and other regenerative agricultural practices. In approximately five years, Native Energy will have an independent, third-party measure the amount of carbon sequestered in the soil. Ranchers are paid based on the amount of carbon that has been sequestered in their soil from the baseline measurements.

WSE hopes to enroll around 100,000 additional acres by this time next year.

RECIPES

By Chandee Bomgardner | Photography By Sara Young

HALUSKI WITH POLISH SAUSAGE AND NOODLES

Creamy White Bean and Turkey Pumpkin Chili

INGREDIENTS:

- 3 tablespoons olive oil
- 1 onion, finely chopped
- 2 carrots, finely chopped
- 2 celery stalks, finely chopped
- 2 garlic cloves, finely chopped
- 1 teaspoon ground coriander
- 2 teaspoons ground smoked paprika
- 1 teaspoon ground cumin
- 1/2 teaspoon crushed red chili
- 1/2 teaspoon freshly ground black pepper
- Kosher salt
- 1 1/2 pounds ground turkey, (can use ground beef or pork as well)
- 2 tablespoons chopped fresh thyme, rosemary or sage (or a mixture)
- 1 (15-ounce) can unsweetened pumpkin purée
- 2 (15-ounce) cans cannellini beans, drained
- 3 cups chicken or vegetable broth
- 1/2 cup heavy whipping cream

INSTRUCTIONS:

1. Pour the oil into a 4 or 5-quart soup pot or Dutch oven and place over medium heat. Add the onion, carrots, and celery and cook until the vegetables are softened, stirring occasionally.
2. Add garlic and all the spices, (except salt) stirring to coat in the oil. Add turkey and cook until it's no longer pink, stirring and breaking the meat up with a spoon, about 8 minutes.
3. Add the herbs, pumpkin, beans, broth and 2 teaspoons salt. Bring to a simmer, partially cover and cook for 25 minutes, adjusting the heat so it doesn't boil.
4. Remove from the heat and stir in the cream. Taste and adjust the seasoning, if needed.

Haluski with Polish Sausage and Noodles

INGREDIENTS:

- 1-pound smoked kielbasa sausage
- 6 tablespoons butter, divided
- 2 cups onion, diced
- 2 garlic cloves, crushed
- 1 ½ pounds green cabbage, cored and cut into bite-sized pieces
- 2 Granny Smith apples (or your favorite) cut into bite-sized pieces
- 1 ½ teaspoons kosher salt
- ½ teaspoon freshly ground black pepper
- 6 ounces dry egg noodles, any size noodles

INSTRUCTIONS:

1. In a large skillet over medium-high heat, cook sausage in 2 tablespoons of butter until crisp.
2. Add onions and sauté for 2 minutes.
3. Add 2 more tablespoons butter, cabbage, garlic, and salt and pepper, cover. Once the mixture is hot, reduce to medium and cook for ten minutes.
4. While cabbage mixture is cooking, cook egg noodles according to package directions and drain.
5. Once cabbage is tender, add apples, drained noodles and additional butter and cook for approximately 2 more minutes.
6. Season with additional salt and pepper as desired. (Lots of black pepper is traditional!)

Steak and Mushroom Pot Pies

INGREDIENTS:

- 1 ½ pounds stewing beef (I used chuck steak cut into chunks)
- 1 large onion diced
- 3 carrots diced
- 4 celery sticks diced
- ½ pound mushrooms sliced
- 2 cloves garlic crushed
- 2 teaspoons smoked paprika
- 1 teaspoon dried thyme
- 1 teaspoon dried rosemary
- 1 teaspoon dried oregano
- 2 bay leaves
- 2 cups strong beef stock
- 1 tablespoon flour mixed with milk
- ⅓ cup milk
- 6 ounces dark stout beer (you drink the rest of the can)
- salt & pepper to taste
- 1 roll ready-made puff pastry rolled out slightly
- 1 egg beaten

INSTRUCTIONS:

1. For the filling, brown the beef in a large pot. Remove and set aside.
2. In the same pot, fry the onion, carrots and celery stalks until soft and fragrant (about 10 minutes).
3. Add the mushrooms and garlic and fry for 5 minutes before adding the paprika and herbs.
4. Pour in the stock, beer and add the browned beef back into the pot. Stir to combine everything and reduce the heat. Cover the pot and allow the stew to simmer gently for 1 1/2 - 2 hours.
5. When the meat is tender (when you press a piece with a spoon it should break apart), turn the heat up and pour in the flour and milk mixture. Allow the sauce to simmer rapidly and thicken for about 10 minutes.
6. Preheat the oven to 350° F.
7. Divide the beef and mushroom filling between 4-6 oven-proof dishes (depending on size).
8. Cut the pastry into squares big enough to cover the dishes, it doesn't have to be perfect. Brush the rim of the dishes with some of the beaten egg then place the pastry on top and pinch the pastry onto the rim.
9. Cut 2 slits into each pie to allow the steam to escape and brush with the rest of the beaten egg.
10. Place in the oven and bake for 25-30 minutes until the pastry is cooked through and golden brown.

Salisbury Steak Meatballs

INGREDIENTS:

For Meatballs

- 1 1/2 pounds lean ground beef
- 1/2 cup breadcrumbs (I used Panko)
- 1 egg
- 1/4 cup ketchup
- 2 tablespoons coarse-grain mustard
- 2 teaspoons Worcestershire sauce
- 1 teaspoon seasoning salt
- ½ teaspoon pepper
- 1 teaspoon onion powder
- 2 tablespoons olive oil for frying

For Gravy

- 2 tablespoons butter unsalted
- 1 large onion chopped
- 1 teaspoon Worcestershire sauce
- 1 cup beef broth
- 2 tablespoons cornstarch
- 1/2 teaspoon seasoning salt
- 1 teaspoon ketchup
- parsley for garnish

For Mashed Potatoes

- 5 large potatoes peeled and chopped into 1-inch cubes
- 4 tablespoons butter unsalted, 1/2 stick
- 1/4 cup half & half milk, add more if needed
- 1/4 cup cream cheese light
- 1/4 teaspoon salt or to taste
- 1/2 teaspoon white pepper or to taste

INSTRUCTIONS:

1. Add all the meatball ingredients (excluding the olive oil) to a large bowl and mix well, use your hands. Shape into 1-inch meatballs. You should get about 40 meatballs.
2. Add the olive oil to a large skillet and heat over medium to high heat. Add meatballs and cook. If you're using a large skillet, all meatballs should fit in one batch, otherwise you might have to fry them in a couple batches. Cook the meatballs on all sides, add more oil if needed. Remove meatballs from skillet and set aside.
3. To the same skillet add butter and melt. Add onion and cook until onion is soft and translucent. In a bowl, add the cornstarch and beef broth and whisk. Add broth and remaining gravy ingredients to skillet and cook for about 3 to 5 minutes; sauce should thicken. If the sauce is too thick, add a bit more beef broth. Taste for seasoning and adjust as necessary.
4. When the gravy is done, add the meatballs back to the skillet and toss them around so they're covered in the gravy. Garnish with parsley.

For Mashed Potatoes

1. Peel the potatoes and cut them in 1-inch cubes. Boil them on medium heat until potatoes are tender, for about 20 minutes.
2. Drain potatoes and in a medium bowl, add the potatoes, milk, butter, cream cheese, salt and pepper. Using a potato masher, mash the potatoes until desired consistency. You may also use a hand mixer if you wish. Add additional milk as necessary.
3. Serve meatballs over mashed potatoes.

Notes

To prevent your meatballs from crumbling and falling apart, do not overcrowd them while cooking. Leave about 1/2 inch of space in between. It's best to do it in a couple batches. It can also be an issue with the binding, meaning not enough egg or too much breadcrumbs. If your eggs are small, add another egg.

Meatballs can be stored in an airtight container in the fridge for 3 - 4 days or up to 3 months in the freezer.

Gravy will keep in an airtight container in the fridge for 3 days and in the freezer for up to 3 months. Pull the gravy from the freezer the day before using, allowing it to fully thaw before reheating on the stove. Mashed potatoes will last for 3 - 5 days in an airtight container in the fridge and up to 10 months frozen. Allow to thaw in the fridge the night before and reheat in the microwave.

Peach Crumb Bars

INGREDIENTS:

Crust and Topping:

- 1 cup granulated sugar
- 1 teaspoon baking powder
- 3 cups all-purpose flour
- 1/2 teaspoon salt
- 1 cup cold unsalted butter cut into cubes
- 1 large egg
- 1 teaspoon pure vanilla extract
- 1/2 teaspoon almond extract
- 1/4 cup sliced almonds optional

Filling:

- 5 cups peeled and sliced peaches, approximately 6-7 peaches, thinly sliced
- 1/2 cup granulated sugar
- 4 teaspoons cornstarch
- juice of 1 small lemon

INSTRUCTIONS:

Preheat oven to 350°F. Line a 9 x 13 pan with foil or parchment paper, and coat with non-stick spray.

Crust and Topping:

1. Using a hand mixer or stand mixer fitted with the paddle attachment, combine granulated sugar, baking powder, flour, and salt. Add butter, egg, vanilla, and almond extract. Beat on low speed until the butter is evenly distributed in small pieces and the mixture is crumbly.
2. Dump a little more than half of the mixture into the bottom of the prepared pan. Use your hand or the bottom of a measuring cup to evenly press dough into pan. Stir sliced almonds into the reserved mixture (for topping).

Filling:

1. Gently stir together all ingredients until combined.
2. Spread the peaches evenly over the crust, then crumble the reserved dough over the top of the peaches.
3. Bake for approximately 40 minutes, until the top is light golden brown, and the peach juices are bubbling. Transfer pan to a rack to cool before cutting into squares. I like to store these in the fridge. They can also be frozen.

Notes

How to peel a peach:

1. Drop the peaches into a pot of boiling water for about 15-20 seconds.
2. Remove with a slotted spoon and place into a large bowl of ice water.
3. Once the peaches have cooled (this happens quickly), you should be able to peel the skin right off using your fingers.

If you'd like to drizzle the bars with icing: whisk together 1/4 cup powdered sugar with a splash of milk and a drop of vanilla extract. Adjust to get your desired consistency by adding more sugar or milk.

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