2023 Ag Times

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Unterrified Democrat

Flying for farmers with both feet on the ground

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BONNOTS MILL — Nathan Troesser of Bonnots Mill founded Missouri Valley Drone, LLC, in 2022. In so doing, he answered a call for solutions which has grown louder with time. How?

For more than 100 years — from the dawn of manned flight early in the 20th century — farmers have looked to the sky for an advantage. In 1906, an Australian farmer used a tethered hot air balloon to seed a rugged stretch of land; and the stewards of the soil haven't been kept down since.

A couple of decades later, manufacturers were building planes, especially for agricultural applications. Companies formed to sell farmers their services. Seeding, fertilizing, and pest or weed control were revolutionized. The benefits of agriculture aviation, though, come at a price. Farmers continue to be willing to pay that price, and pilots continue to answer the call in return for their dollars. Nevertheless, some seek answers to agriculture aviation's persistent questions.

Most first answers to tough queries, however, form even more questions.

Earth-bound machines like tractors can only cover ground at a certain pace, limited by friction and obstruction. They spend hours in the field, plowing through soil that is only occasionally ideal for tilling. Farmers often work under a hot sun while racing the sunset. That's after jumping into the seat long before entirely awake, shortly after sunrise. The hours seem to fly while the tractor crawls across the acres, and it's easy to let the mind wander to the sky.

Meanwhile, a field not far away is being worked by an airplane, done in a fraction of the time.

Friction? That machine only needs enough air density to let lift overcome the drag on its wings. Soil moisture and quality? Not in play. Weather? Well, it can be too windy, but heat and cold don't bother a pilot as much. Coverage is a lot wider and

faster. It's no surprise the industry has grown in significance.

Almost every aviation manufacturer offers multiple crop dusting planes; almost every agricultural area worldwide has numerous companies providing aerial application services. Most travelers on flat highways far from cities have watched agrarian aviation. A small but sturdy plane is flying close to the ground with a cloud of something in its wake — seed, pesticide, insecticide, or fertilizer. The ground underneath is getting a head start that tractors can't match.

There are, though, those "even more questions."

Crop-dusting is dangerous for pilots. Flying close enough to the ground to get the payload delivered accurately is not what pilots like to do. Remember that problem of obstructions in the soil? Well, it turns out there are a few in the sky as well. When

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a plane hits one of those, it causes more problems than a tractor or implements hitting one hidden in the dirt. Plus, what about wind or a misunderstanding of the geography beneath the plane? Seed and chemicals can be wasted or sent where they're not wanted or even tolerated.

How serious are these problems? Consider a few facts. Fatal accidents for agriculture pilots occur more than 10 times as often as in general aviation. Nor is that a reduction of any kind compared to a few decades ago. Commercial aviation is now 80% safer than at the turn of the century, but agricultural aviation is as dangerous as ever.

Nor have operators gained ground addressing the difficulty of the job. It's physically challenging. It demands climbs, drops, and turns, often creating a lot of gravitational stress on a pilot's body. Plus, conditions can require that flights meet tough schedules. This is due to weather, planting and fertilizing optimal conditions, and seasonal demands. Agriculture pilots can't just fly when they feel like it, skipping days when they'd rather stay on the ground. If a plane can go up, pilots need to take it up when a farmer is willing to pay for it.

"You have to be at peak physical performance to survive the busy season," says one, quoted by Victoria Bottomley, a pilot and an author who flies an Airbus A320 but has a heart for those who fly crop-dusters. "You also have to know when it is time to quit due to physical fatigue, mental fatigue, or sleep deprivation. The head game is a big part of safety."

Is there an answer to the dangers and difficulties faced by those crop dusters? Nathan Troesser has one; he actually has a few.

Missouri Valley Drone can deliver the goods. Troesser

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doesn't need a tractor to distribute seed, chemicals, fertilizer, and some other solutions. Nor does he have to put his life in danger, dodging power lines, towers, and other low-flying aircraft. He flies drones, so his feet are always safely on the ground. Sure, he'd like to keep his drones safe. They cost money. However, keeping an operator safe is always a bigger deal.

Remember that thing about flying close to the ground? Drones can do that better than even the best-piloted aircraft. What can even a slight wind do to a stream of product from a low-flying airplane? It can do much less with a stream from a lower-flying drone. "Drones are more precise and have less product drift, making aerial application safer for neighboring farms," Troesser noted.

Troesser's skills have made a name for themselves in a short period.

"About 50 percent of our clients are from Osage County and surrounding areas," he said. "We enjoy working locally but are beginning to reach out to more areas around the state, even some out of state."

Those skills are magnified by some top-tier equipment. He flies a variety of crafts manufactured by the multinational company DJI. His favorite is a DJI Agras T40. It boasts a 10.5-gallon tank with a spray width of about 12 yards. "It is the most efficient spray drone available," Troesser asserted. "We are very excited to get this new drone out in the field."

Troesser's T40 recently seeded a remote pasture for Steve Smyth of Seven Thunder Bison Ranch near Chamois. "We have some pasture we just can't reach with our equipment," said Smyth. "Nathan got it done in a couple of hours."

Smyth's herd will soon enjoy increasingly rare native prairie grass, the kind buffalo like to eat. Planted in early February, it should save him a lot of hay before winter. Missouri Valley Drone may be there again if that pasture stays off-limits for machines but not animals.

Troesser's services may be obtained by

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calling 573-418-7103 or logging on to www.movalleydrone.com. “We rely on quality work and building relationships with clients,” said Troesser.

He’s also become a DJI dealer. “We provide others with agricultural drones and training on how to operate them safely and efficiently,” said Troesser.

Aviation has been getting more people together since flight began. Farmers now have more of it available to form relationships. It can now be done in a safer, more efficient way than ever. Troesser can perform that service without even flying to, let alone over, the field.

Things everyone can do to support rural economies

Efforts to revive small business sectors have helped countless communities regain their prosperity and sense of community pride. Those efforts have been wildly effective in many urban areas, and they also can help rural economies recover from the many challenges they've been confronting since the Great Recession, which occurred between 2007 and 2009.

Rural communities have faced many unique challenges since 2007. For example, a 2019 study published in the journal Rural Sociology found that 46 percent of remote rural counties were depopulating, while just 6 percent of metropolitan counties were facing population losses. Reviving rural communities does more than help the people who call those communities home. Thriving rural communities can ensure access to fresh foods for people in both rural and urban areas, thus keeping costs down. Thriving rural communities also can reduce reliance on government assistance programs. With access to well-paying jobs, more people in rural communities can live above the poverty line. That's a significant benefit, as the U.S. Department of Agriculture reports that roughly 85 percent of counties combatting persistent poverty are rural.

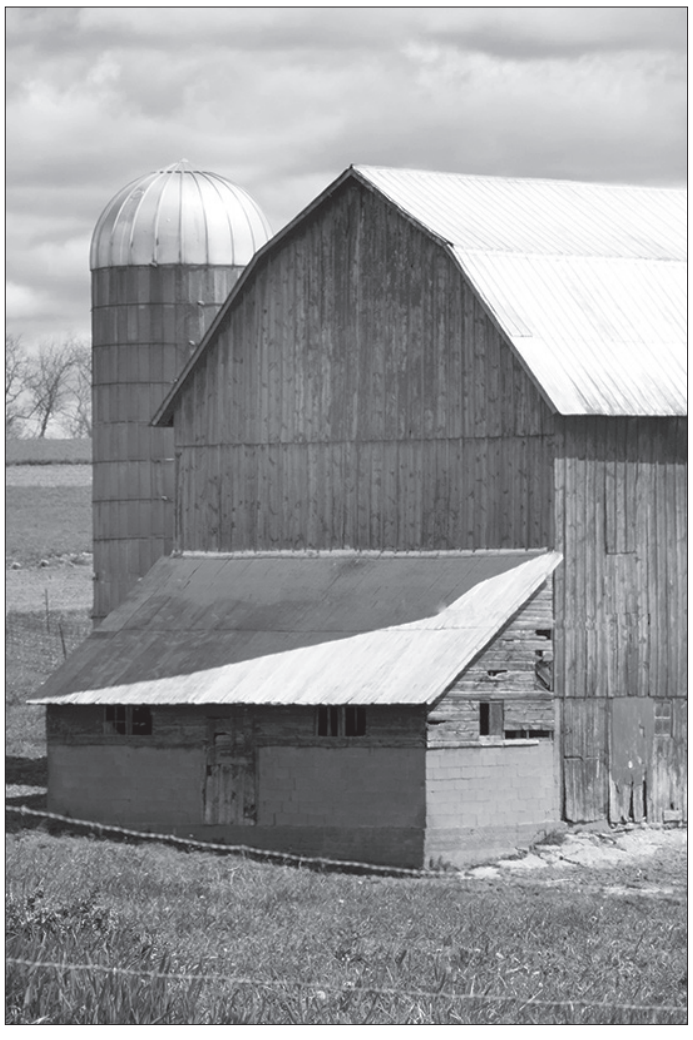
Attempts to revive rural economies will require a collective effort on the part of people from all walks of life, and there's much everyone can do to pitch in.

• Buy products from local farms. When buying foods, looking for products from local farms and/or domestic farms can benefit consumers in various ways. Many individuals find locally grown foods more flavorful than products imported from foreign countries. And buying local, whether the farm is on the outskirts of the metropolitan area you call home or elsewhere in your own country, provides some much-needed economic stimulation to rural communities.

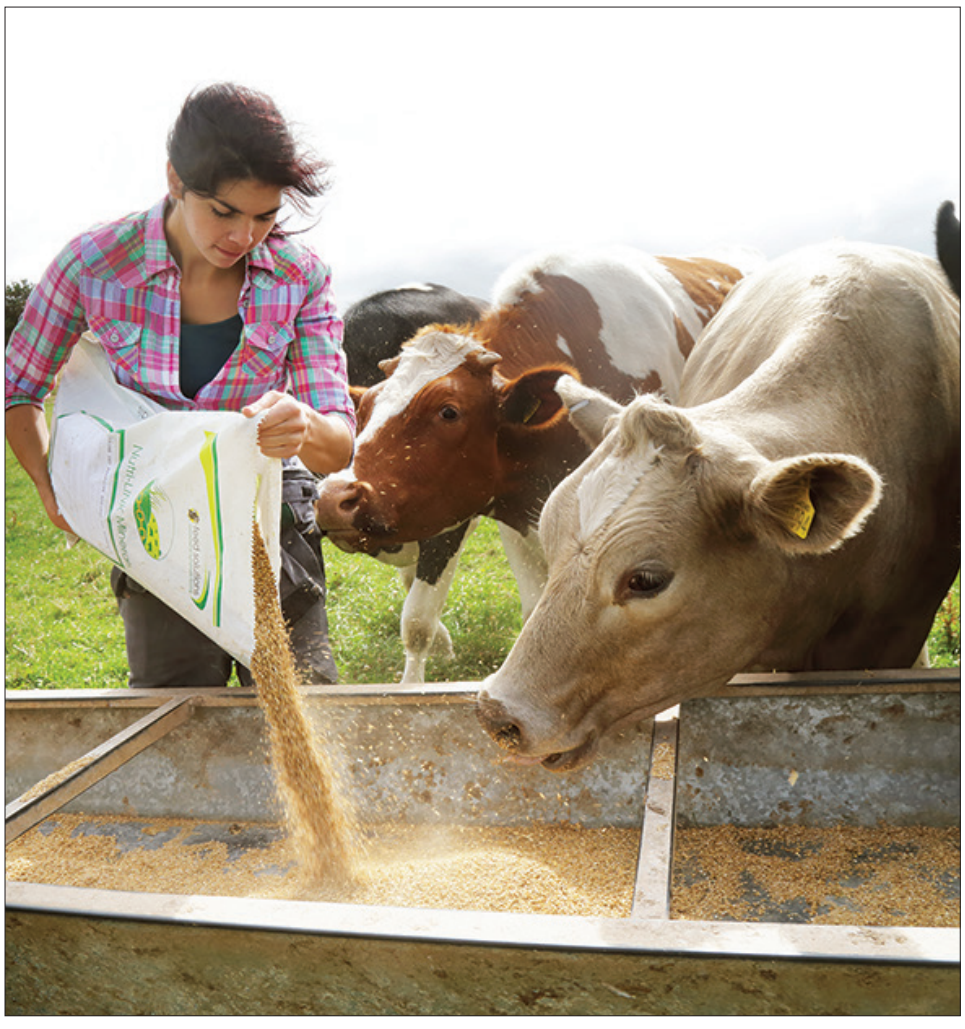
• Look beyond foods. Rural communities produce more than food. Soaps, lotions, candles, decorative items, and other products people use everyday are produced on farms and within rural communities. Choosing these products over mass-produced alternatives made in other countries or in places where profits are less likely to be funneled back into local communities is a great way to support rural economies.

• Support legislation that benefits rural economies. One of the most effective ways to lend a hand to rural economies is to support legislation that can help them. There are many reasons why rural economies have fallen on hard times, and a lack of digital infrastructure has undoubtedly contributed to those struggles. All businesses benefit from a strong online presence, and communities can attract more remote workers if their digital infrastructure is improved. Those improvements are often the subject of local, state and even federal legislation. Individuals who want to help rural economies can urge their representatives to support legislation that can help rural communities build their digital infrastructure so it's on par with that which has already been established in more populous areas.

Rural economies are struggling. However, there's much everyone can do to pitch in and support efforts to revive rural communities.



Advancements in livestock technology



Consumer demand drives changes in industry, and the agricultural sector is no exception. Consumer demands for improved animal welfare have led to changes in the livestock sector, and various technologies have been developed and are in development to help this particular segment of the agricultural industry thrive.

According to the Animal AgTech Innovation Summit, various startups have developed technologies that can make the livestock industry more sustainable and efficient.

Treatment

The Israeli firm Armenta has developed a non-antibiotic treatment for bovine mastitis that utilizes acoustic pulse technology. The treatment has a 70 percent cure rate.

Another firm working to treat livestock is the United States-based General Probiotics. Animal AgTech reports that General Probiotics develops cellbots and antimicrobial probiotics that eliminate harmful pathogens in livestock. That can reduce dependency on antibiotics and make food production safer.

Welfare

Faromatics, a firm based in Spain, has combined robotics, artificial intelligence and big data to improve animal welfare and farm productivity. One Faromatics product utilizes a robot suspended from a ceiling to monitor certain variables, including equipment function and health and welfare, that affect broiler chickens.

The American firm Swinetech utilizes voice recognition and computer vision technology in its SmartGuard product to prevent piglet deaths from crushing and starvation. The product also makes it possible to track and facilitate obstetrical assistance.

Operations

Based in Uganda, Jaguza Tech has developed a livestock management system that utilizes sensors, data science and machine learning to improve the efficiency, productivity and sustainability of modern farm operations. Farmers can utilize Jaguza to perform a host of functions, including monitoring their animals' health and identifying their livestock.

The Netherlands-based H2Oalert is a water control management system that checks the quality and quantity of cattle drinking water in real time. The management system also checks for pollution and malfunctions in the water supply.

Livestock technology continues to advance, and firms across the globe are developing new products and platforms to help livestock farmers make their operations more efficient, sustainable and productive.

Heroes to Hives and other MU Extension programs help veterans

BY LINDA GEIST
Missouri University Extension

POTOSI — Beginning farmer and 25-year Army veteran Eric Work's calendar is full of educational programs offered by University of Missouri Extension.

"MU Extension programs are a godsend," Work says. "I benefit from the amazing, high-quality learning opportunities that University of Missouri Extension continually provides, not only to veterans but many other diverse groups that are interested in learning and potentially pursuing new careers."

A favorite of Work's is the Heroes to Hives program, which trains veterans in beekeeping. MU Extension agronomist Travis Harper teaches the hands-on portion of the program in Missouri. Army veteran Adam Ingrao of Michigan State University Extension, who developed the program, presents the online portion.

Students receive two to six hours of prerecorded lecture content from March to November so that they can learn at their own pace. On-ground training is April to October at the Heroes to Hives apiaries at the University of Central Missouri's Mitchell Street Farm in Warrensburg and the MU Southwest Center at Mount Vernon.

Participants learn ways to earn income through the sale of honey as well as value-added products such as candles, lip balms and mead.

More important than the technical knowledge is the opportunity to connect with other veterans, says Work. Missouri has more than 440,000 veterans making the transition from military to civilian life. "A lot of veterans come right out of the service and may feel disconnected and may be struggling with finding job opportunities or facing other issues," he says. "The Heroes to Hives program offers a diversion as well as opportunities."

Work grew up in a military family. His father retired from the military, his brother, Richard, served for 20 years, and one of his sons is in the U.S. Air Force in Okinawa.

Work says Heroes to Hives served as a gateway to other MU Extension programs, such as Missouri Beginning Farmers and Ranchers, which helps him learn about business plans, government programs and grants for farmers and ranchers, financing and how to grow and market specialty crops. He works full-time as a business continuity/disaster preparedness professional but is preparing for another career as a farmer.

Bees are not Work's only passion. He is on the advisory board for Peaceful Pastures Donkey Rescue in Lincoln, Missouri. The nonprofit rescues donkeys that are abused, neglected or at risk for slaughter. Work's 35-acre farm in Potosi includes eight horses, 13 dogs, 14 cats and a house pig named Mojo. Most are rescue animals.

To learn more about Heroes to Hives, call 800-995-8503 or visit mizzou.us/heroestohives.

ERIC WORK maintains beehives at his farm in Potosi, Mo. Work, a 25-year Army veteran, says the Heroes to Hives program offered through University of Missouri Extension and Michigan State University Extension gives veterans and their families an opportunity to learn about beekeeping.

PHOTO COURTESY OF ERIC WORK

IN ADDITION to tending bees, U.S. Army veteran Eric Work is on the advisory board of Peaceful Pastures Donkey Rescue, a Missouri nonprofit that rescues donkeys that are abused, neglected or at risk of slaughter.

Explaining precision agriculture

Few, if any, aspects of life in the 21st century have not been touched by technology. Advancements in technology have affected everything from the way students learn in the classroom to how senior citizens connect with their grandchildren. Technological advancements also have left their mark on industry, including the agricultural sector.

Modern agriculture bears some similarities to farming of past eras. Technology has affected the agricultural sector for centuries, and modern farmers know that's no different today. One of the more recent developments in the agricultural sector is the rise of precision agriculture, a farming management concept that can pay dividends for generations to come.

WHAT IS PRECISION AGRICULTURE?

Precision agriculture (PA) is rooted in improving crop yields through the utilization of technology. PA is designed to help the agricultural sector maximize resources and improve yields and the quality of crops. That's a critically important function as the world population continues to grow and the demand for food increases as a result.

WHAT ARE SOME EXAMPLES OF PA TECHNOLOGY?

Sensors are a prime example of PA technology that helps make farms more efficient and productive. Sensors serve various functions by helping farmers gather data on the availability of water in soil, the level of compaction in soil, leaf temperature, insect and disease infestation, and other areas.

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How agricultural technology can help improve sustainability

Sustainable agriculture is an approach to farming that will allow modern farmers to meet the needs of a growing population while enhancing environmental quality. That can benefit both current and future generations, and technology will play a vital role in realizing the goals of sustainable agriculture.

According to the National Sustainable Agriculture Coalition, sustainable agriculture is designed to meet the needs of the present without compromising future generations' ability to meet their own needs. That's a worthy goal, especially in the face of a growing global population that the United Nations estimates will increase by two billion persons by 2050.

There are numerous benefits to utilizing sustainable agriculture technology, which can be especially advantageous to modern farmers.

EFFICIENT LAND MANAGEMENT

Modeling technologies can be utilized to make more efficient use of land. According to Sustainable Brands, a global community of brand innovators, modeling technologies can be employed in a host of ways, including to identify tillage practices and the status of tile drainage. Certain agricultural technologies have been designed to predict the performance of cropland, which can allow farmers to more effectively and efficiently use their land. Farmers also can employ modeling technologies to determine soil health and water needs and usage, which can benefit the land and ensure resources aren't wasted. Utilization of such technologies ensures farmers can meet the needs of modern consumers without affecting future farmers' ability to do the same.

REDUCE RUNOFF

The United States Environmental Protection Agency notes that runoff poses a significant threat to the environment. When runoff occurs, fertilizer, bacteria and other pollutants find their way into streams, rivers, lakes, and the ocean. Sustainable Brands notes that nanotechnology is an efficient way to deliver nutrients to crops that can improve both the efficacy of the nutrients and reduce runoff.

PROTECT CROPS

Sustainable Brands notes that agricultural biologicals are inputs derived from natural materials that have low toxicity. That low toxicity reduces their environmental impact. Agricultural biologicals utilize the properties of such things as bacteria, fungi and even insects to support healthy crops, potentially improving yield without adversely affecting the environment.

Sustainable agriculture technologies can help modern farmers and their successors meet the needs of a rapidly growing global population.

Precision AG

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Weather modeling is another component of PA that can help farms be more cost-effective and efficient. Whereas in years past many farms would need to manually assess certain variables to determine when to harvest, weather modeling technology has enabled some farmers to generate remote readings, saving time and money.

HOW DOES PA HELP FARMERS?

Each situation is unique, but the principles of PA can help farmers acess a wealth of information. It might have been possible to access such information in the past, but PA has sped up the process and made it more hands-off, allowing farmers to save both time and money. PA technology can help farmers maintain accurate records of their farms; inform their decisions; make it easier to detect and identify problems, sometimes before they escalate into larger issues; and avoid potentially costly mistakes.

Technology has left no industry untouched. The growth of precision agriculture is a testament to the influence that technology is having on a vital sector of the global economy.

"Not every weed is bad" at Central Missouri Forage & Beef Conference

BY COLIN WILLARD
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VIENNA — Many farmers and agriculture workers made their way to the Knights of Columbus Hall in Vienna on March 3 to attend the Central Missouri Forage & Beef Conference. The University of Missouri Extension hosted the conference, which featured a dinner, a trade show with more than one dozen booths and a panel of producers to discuss interspecies grazing. Speakers also gave presentations on a variety of topics including grazing and vaccination.

Gatlin Bunton, Director of the Wurdack Extension and Education Center in Crawford County, gave a presentation that challenged the perception of weeds as useless pests.

"It's not always that every weed is a bad thing," Bunton said. "If it's not a bad thing, we can probably look at it as forage. Some of you might shake your heads at that, and that's alright because weeds are weeds. But if it has forage value, and it is growing, and we need forage, then that's pretty valuable to our operations. A lot of people probably relied on weeds last year during the drought."

Bunton acknowledged some of the things that give weeds a bad reputation. They are the most abundant pest in Missouri pastures while outnumbering creatures such as armyworms and rabbits that often disrupt the pasture environment. Weeds also occupy space and displace other forms of forage while using resources such as light, water and nutrients in the soil.

The average field contains 20,000 weeds per acre. Cultivators can weigh their options for controlling weeds because some, such as dandelions, are digestible for grazing animals. Many other weeds are toxic. Spraying herbicides and mowing weeds are common solutions, but Bunton said grazing is also a good tool for clearing weeds.

"By the end of the summer, that means we have a lot of potential to either break the sprayer out or turn the cows on it," Bunton said. "It all depends on what we're looking at."

One of Bunton's points in favor of grazing as weed control was the economic value. The cost of mowing weeds can be unpredictable because of fluctuating diesel prices. Herbicide sprays also cost money but offer an opportunity for better control. However, if cows graze the weeds, the solution to a weed problem no longer costs money. Instead, it provides value by feeding the cows.

"It's a mindset change," Bunton said. "Those animals are grazing, and at some point, if we can teach them to keep grazing it, that's a useful skill."

Bunton shared some anecdotal evidence from his work

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GATLIN BUNTON, Director of the Wurdack Extension and Education Center gives a presentation on weeds.

PHOTOS BY COLIN WILLARD

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at the Wurdack Extension and Education Center. He said that the manager before he took over did a very good job of controlling weeds. The cows there did not eat weeds when grazing. After increasing the stocking density at the research center, the cows began to eat weeds such as ragweed broadleaf plantain to a point that Bunton described as a "pretty even mow."

Cattle are more eager to graze on some types of weeds than others. Bunton said that some weeds, such as chicory are valuable because they are palatable for cows due to their easily stripped leaves.

Palatability is a large part of how cows respond to grazing weeds. Bunton presented data about how often cows ate certain weeds. Cattle grazed dandelion, which is one of the more common weeds in the state, at an 86 percent rate. Unfavorable weeds scored much lower. The cows that were part of the study only ate ironweed at a rate of about eight percent.

"I have the habit of going around and tasting weeds," Bunton said. "I know my mouth isn't the same as a cow's, but ironweed is pretty darn gross."

Bunton pointed to common ragweed, which appears in 97 percent of pastures but cows only graze 28 percent of the time, as a good target for cattle owners to use for grazing. When it first starts to grow and appears about four or five inches above the ground, cows eat it more often because it offers 26 percent protein. Once it reaches maturity, it still has about 15 percent protein, but cattle are less likely to eat it.

Ultimately, cattle's reception to eating weeds is herd-dependent though they can learn to eat it. One method for teaching weed grazing is what Bunton called identity grazing.

"We just threw 93 head on three acres, and eventually they all started grazing it," Bunton said. "We did that a couple of times, and now those cows eat weeds a little more readily than before we got started. If we can teach one cow to do it, and she's dominant enough in that herd, usually she will pick that up and other cows will follow."

Another method to encourage cattle to graze on weeds is to make the plants more palatable. The taste of the weeds can improve by spraying sugar or molasses on them. Bunton said this method might need a few tries to work, but they will start eating the weeds eventually.

The other method Bunton suggested was one he said the Australian Department of Agriculture, Fisheries and Forestry had endorsed for decades. The process involves spraying sub-lethal doses of herbicides on weeds. Although the herbicide will not kill the plants, it will cause them to twist and cells will break. That releases sugar, which makes

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the weeds more palatable to the animals.

Bunton said that one thing to beware of is that if cows learn to graze palatable weeds, they can also learn to graze toxic weeds. Anyone training cows to eat weeds should ensure that no toxic weeds are in the grazing area.

"It just takes one naive animal to be effective, and with the price of cows right now, nobody can afford to lose any," Bunton said.

The presentation included photos and facts about some of the state's most common toxic weeds to kill instead of teaching cows to graze them. Those species included black cherry, jimsonweed, perilla mint and poison hemlock.

Poison hemlock is among the most toxic plants in Missouri. It is biannual, so it is a rosette with a purple stem in its first year before growing to look like giant wild carrot. Bunton said that lethal doses of poison hemlock scale at about two to six grams per pound of body weight.

"When you do the math on that, it comes out that a 1,000-pound steer would die after eating about the normal-sized salad," he said. "Just a couple of bites and that thing would be dead. One plant could wipe out a fair number of animals if they were to graze it."

Bunton said most herds will not eat poison hemlock, but owners should still be aware because some animals are naive and will eat it.

Later, Bunton said that grazing weeds is a good way to get cattle through a drought. He also reiterated the value that some weeds have when used as forage.

"You have a lot of forage built in there that you didn't necessarily have to plant," he said. "We can actually manage weeds. It's very counterintuitive, but if you're using it for forage, we need to make sure we keep some of them on our place. Not every weed is bad. Not every weed is good."

Bunton recommended that anyone with more questions about Missouri's weeds should read the Weed and Brush Control guide published by the University of Missouri Extension.

LOCAL FARMERS attend the Central Missouri Forage & Beef Conference at the Vienna Knights of Columbus Hall on March 3. **PHOTOS BY Colin Willard**

State AG officials push for on-time farm bill to fund slew of programs

WASHINGTON – State agriculture officials from across the country sought this month to remind a new crop of lawmakers in Congress of their states' needs for a robust farm bill to address a host of food issues.

Members of the National Association of State Departments of Agriculture gathered in Washington for their annual winter meeting in mid-February. They urged Congress to provide a timely, fully funded farm bill to address a wide range of issues affecting agriculture, including technology, conservation and foreign trade.

Throughout its two-day conference, members of the coalition stressed the bipartisan history of the bill and the importance of educating a new Congress on titles that support American food systems amid changing economic and environmental landscapes.

The state officials urged Congress to include nutrition programs in the farm bill, as past versions have done. They also advocated for bolstering crop insurance and allocating more money to research, animal safety, and conservation programs.

"It's just a responsibility we have to make sure that all of our producers, our economies, our communities of every size have a forward-looking and fully funded farm bill," NASDA president Doug Miyamoto, the director of the Wyoming Department of Agriculture, said in an interview.

"We've got to make sure that we do this correctly," he added. "We can't start splintering off programs and splintering off ideas in the farm bill, and then hoping that we're going to be able to get a comprehensive farm bill that's on time."

Mike Naig, secretary of the Iowa Department of Agriculture and an elected Republican, said it's important for lawmakers — especially those who weren't in office when the 2018 bill was written — to remember that the measure is not just a farm bill, but a farm-and-food bill.

"There's a lot of new members of Congress that have never had a chance to vote on a farm bill," Naig said. "A lot of work has to be done to educate folks on that."

Kate Greenberg, the commissioner of the Colorado Department of Agriculture who was appointed by Democratic Gov. Jared Polis, also advocated for considering nutrition and agricultural policy in the same bill to keep the "critical nexus point of production and consumers."

She added members of Congress must put aside their differences to strengthen the "bread and butter of the American economy."

"Let's keep our heads down and focus on the impact of the policy and the appropriations on the American landscape in agriculture," she said.

The five-year farm bill does not appropriate funding, which Congress does annually in separate bills. But it does authorize dollar amounts for discretionary programs that set expectations for actual spending bills. Other programs authorize mandatory funding not subject to annual decisions by lawmakers.

Lloyd Knight, deputy director of the Idaho State Department of Agriculture, encouraged Congress to provide certainty to farmers across the country by finishing the farm bill before the current authorizations expire Sept. 30.

SECURING NEW TECHNOLOGY, FOREIGN MARKETS, AND THE SAFETY NET

Mike Strain, the Republican commissioner of the Louisiana Department of Agriculture and Forestry, advocated for increasing funding for research and development of technology, especially as demand continues to outpace supply for U.S. agricultural goods.

Louisiana sugar production, for example, needs to be twice as efficient as it is today, he said.

Jeff Witte, director of the New Mexico Department of Agriculture, said research provisions would also be key for Western specialty crop farmers who need to address worker shortages.

Farmers in the state have converted from vegetable crops to tree nuts because the labor was cheaper, he said. But that trend could lead to an unwanted imbalance in what food crops are available to consumers, he added.

"If we don't start investing in technology that can do the harvesting of other produce crops, we're going to get way too far behind," he said.

Alabama Department of Agriculture and Industry Commissioner Rick Pate, a Republican, said developing foreign markets through the Foreign Agricultural Service should be a priority in the bill.

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U.S. Under Secretary of Trade and Foreign Agricultural Affairs Alexis Taylor said in a February 1 Senate hearing that for every dollar the U.S. invests in developing foreign markets, U.S. farmers see a $24 return in the value of their products.

"They think there's a huge return on what travel we can do and the marketing program that they find through our organization," Pate said. "So we just need to continue to take the farmer story to people."

Naig added the new farm bill needs to modernize and reinforce the federal crop safety net.

"I just don't want to see anything undermine the importance of the crop insurance program," he said.

BUILDING CONSERVATION AND FOOD SAFETY PROGRAMS

Naig said farmers had broad interest in market-based environmental incentives in the coming farm bill. Concepts like soil health and carbon sequestration have entered the mainstream of agribusiness, but farmers are still wary about their costs.

"What has to be acknowledged is that there's costs associated with implementing some of these practices," Naig said. "So if you want to see significant adoption, how do you help them achieve a return on that investment? If you do that well and do that correctly, you will get implementation at a scale that you couldn't otherwise."

Jordan Seger, deputy director of the Indiana State Department of Agriculture, said he hopes to see federal encouragement of public-private conservation partnerships. He touted Indiana's work with the Nature Conservancy and Enterprise Rent-a-Car to regrow wetlands and forests in the state.

"With about one dollar, we can get about seven or more dollars from the federal government, put that all toward private lands, and leverage each other's resources and expertise to get things done quickly," Seger said.

Randy Romanski, who was appointed secretary of the Wisconsin Department of Agriculture, Trade, and Consumer Protection by Democratic Gov. Tony Evers, said Congress should use the farm bill to get a better handle on animal health, noting outbreaks of avian influenza that have plagued the country since 2015.

Congress could create a national warning network for emerging animal diseases, like avian flu and African swine fever, he said.

"Clearly, this is something that crosses state boundaries," Romanski said. "We need to have systems in place to track, respond to and eradicate diseases when they show up."

SETTING TERMS FOR STATE AND FEDERAL COLLABORATION

The coalition members said Congress should offer clear guidance and resources so states can make choices that suit their constituents.

The federal government should avoid placing mandates on conservation practices, Seger said. Increased collaboration between USDA agencies would also reduce paperwork for states, he added.

Knight, of Idaho, added that Congress must ensure federal programs are fully staffed. Clear guidelines on implementation that are flexible enough to accommodate the diverse needs of farmers throughout the country would also be key, he said.

"It's a big country with a lot of issues and a lot of resources," Knight said.

Colorado's Greenberg said the bill also presents an opportunity to reinforce climate-related policies.

"The thing about climate change is that we're all impacted, and our farmers and ranchers are on the frontlines," Greenberg said. "They're the ones who are feeling and experiencing the changes in the environment, and they know it. So how do we address that, not just state-by-state, but as a nation?"

TIMELINE IN QUESTION

Members of the group predicted Congress would finish either by its fall 2023 deadline or next year.

Strain said he believed negotiations would likely bleed into 2024.

Regardless of the timeline, the bill must be funded appropriately, without an overemphasis on the nonpartisan Congressional Budget Office's score, Strain said.

"You know, it always runs over, or we get to the threat of having to revert to the previous farm bill," he said. "But the other thing is that when we pass it, we can't pass it in such a manner as to just try to get a low CBO score."

Others in the state agriculture delegation expressed cautious optimism over the prospects of a farm bill in 2023, noting that there would be consequences for U.S. farmers if a new bill is not passed on time.

"I'm really encouraged by what (U.S. House Speaker) Kevin McCarthy said this week, that they're going to get it done," Pate said. "People need to understand the impact of that kind of stuff. Just like a government shutdown, these things have consequences when they don't get them done."

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The role of technology in agriculture

Modern industry is driven by technology. Advancements in technology have changed how business is conducted, with some industries undergoing dramatic changes since the dawn of the 21st century.

While agriculture might not be the first industry people think of when reflecting on the changing nature of industry, The National Institute of Food and Agriculture notes that modern farms are vastly different than those from a few decades ago.

Farmers have long relied on technology to make their operations as efficient, productive and profitable as possible. Precision agriculture, which refers to technological advances designed to propel agriculture into the modern, computerized and information-based world, is helping the agricultural sector become more profitable and efficient while also improving safety and making agriculture more eco-friendly. In addition, the NIFA notes that the modern agricultural industry employs technology such as robots, temperature and moisture sensors, aerial images, and global positioning systems.

If it sounds complicated, that's because it is. For example, modern sensors can detect soil conditions, potentially producing hundreds of readings per second. These sensors help farmers know the best possible time to plant seeds so they can reach their full potential. That improves both the efficiency of modern farms as well as their output.

The NIFA also notes that agricultural technology has reduced waste. For instance, thanks to agricultural technology, farmers no longer have to apply water, fertilizers and pesticides uniformly across entire fields. Technology has shown that farmers can simply target specific areas or even treat individual plants differently. That saves time and allows farmers to use only minimal quantities of water, fertilizer and pesticides. In addition, according to the NIFA, employing agricultural technology in this fashion leads to higher crop productivity and reduces runoff of chemicals into rivers and groundwater, thereby reducing the farm's impact on local ecosystems.

Modern farms are technological marvels where various technologies are being employed to produce crops more efficiently and safely than ever before.

Tips on selling your timber

BY LINDA GEIST
Missouri University Extension

KIRKSVILLE — There are important steps to take when considering selling timber, says University of Missouri Extension forester Hank Stelzer.

In addition to providing additional revenue, harvesting timber can improve the health and vigor of woods and wildlife.

Most landowners don't know the value of their woodlands, Stelzer says. Too often, landowners make uneducated decisions on selling their trees and underestimate their value.

Stelzer recommends consulting with a forester. Professional foresters can help guide the process so that the seller benefits financially and the woodlands remain in good health. Public foresters, such as those with the Missouri Department of Conservation, can provide assistance but there may be a wait. "While consulting foresters charge for their services, they work for you and are usually more responsive," he says.

Stelzer offers these tips:

1. Educate yourself and know what you have to sell. Read guides and talk with other woodlands owners in your area. MU Extension publication G5051, "Selling Timber: What the Landowner Needs To Know," is available for free download at extension.missouri.edu/p/G5051. "While the information in this guide will not make you an expert, it will familiarize you with the overall process and some of the lingo used by both foresters and loggers," Stelzer says.

2. Work with a professional forester. Call 877-564-7483 or go to www.callb4ucut.com/missouri(opens in new window). This free service will send a consulting forester to your property to give an initial assessment. If they determine you have a potential sale, you can hire them or you may contact a Missouri Department of Conservation forester. Either forester will identify which trees to harvest based on your overall objectives and the financial and biological maturity of trees in the sale area. They will also determine the potential value of the sale based on species, merchantable volume and quality.

3. Find a trained logger. The Missouri Forest Products Association lists professional timber harvesters by county at www.moforest.org/loggers. "Insist at a minimum that the logger you hire has completed the association's Professional Timber Harvester Program," says Stelzer. "Better yet is for the logger to have earned their Missouri Master Logger certification. Your professional forester helps you with this as part of their services."

4. Know how to report your sale to the IRS. "Managing Your Timber Sale Tax," at extension.missouri.edu/g5056, has guidance on how to report the sale of your trees to minimize your tax liability.

For more resources, visit MU Extension's Missouri Woodland Steward website at muext.us/WoodlandSteward.

Career paths in agriculture

As the world population grows, the role of the agricultural sector will become even more prominent. There should be significant demand for agricultural professionals capable of meeting the challenges facing the world as it confronts climate change and food shortages. That makes now a perfect time for students to explore potential career paths in the agricultural sector.

• Agricultural engineer: Agricultural engineers employ engineering principles to solve issues related to agricultural production. An agricultural engineer may design facilities or machinery or develop solutions to address problems related to irrigation and soil conservation, among other projects. Students interested in a career as an agricultural engineer can expect to study mathematics, physics, chemistry, computer engineering, and, of course, engineering analysis and design as they pursue their degrees.

• Agronomist: Agronomists work with crops and soil management and may work as analysts, environmentalists or forecasters. Agronomists may be tasked with analyzing soil structure and chemistry and study how water is moving within soil. Students will study agriculture, biology, chemistry, and

See **Career**, Page 22B

MU Extension guide has tips on controlling black vulture damage

BY JULIE HARKER
Missouri University Extension

COLUMBIA, Mo. – Missouri's growing population of black vultures has led to increasing attacks on vulnerable livestock. Black vultures often inflict damage to the eyes and tongues of young livestock, kill and feed on domestic fowl and scar animals that survive.

A new MU Extension guide provides information for livestock producers to prevent and control problems with black vultures. "Controlling Nuisance Black Vultures in Missouri," available at extension.missouri.edu/g9466, was developed by MU Extension state wildlife and fisheries specialist Bob Pierce and Travis Guerrant, Wildlife Services state director for Missouri and Iowa at the USDA Animal and Plant Health Inspection Service.

The guide details nonlethal damage control techniques, including the use of effigies, lasers, pyrotechnics or loud noises to scare vultures, and provides livestock management recommendations such as moving cattle with calves nearer to protected areas, Pierce said.

"Black vultures are legally protected under the Migratory Bird Treaty Act of 1918, so a permit to use lethal control methods is required," he said. The guide outlines the process for obtaining a permit should it be warranted.

USDA APHIS Wildlife Services is charged with responding to conflicts with migratory species, including black vultures, Guerrant said. He advises Missouri livestock producers who suffer damage from black vultures to first contact the Wildlife Services state office in Columbia at 573-449-3033, ext. 10, to discuss the problem and/or schedule a site visit for a customized damage management plan.

If warranted, livestock owners who have experienced depredation from black vultures may obtain a permit to use limited lethal measures through Missouri Farm Bureau.

See **Black vulture**, Page 23B

BLACK VULTURES feed on dead animals but can also gang up and prey on calves, piglets, lambs and newborn goats. Photos courtesy USDA National Wildlife Research Center.

The link between agriculture, food security

The world faces many unique challenges in the decades to come, including a rapidly expanding global population. The United Nations estimates that the global population will reach 9.71 billion in 2050. That's an increase of more than 1.7 billion people between 2023 and 2050.

Food security is among the more significant challenges the world will face as the population increases. The United States Agency for International Development notes that food security means all individuals, regardless of their physical or economic circumstances, have access to sufficient food to meet the dietary needs for a productive, healthy life. Food security is a more significant issue than people may recognize, even in first world, fully developed countries. For example, the United States Department of Agriculture's Economic Research Service indicates that slightly more than 10 percent of U.S. households were food insecure at some point during 2021. In fact, estimates suggest more than 800 million people across the globe go to bed hungry every night, which underscores the seriousness of the issue.

AGRICULTURE AND FOOD SECURITY

Food security and the agricultural industry are inextricably linked. The USAID indicates that most of the people who go to bed hungry at night are smallholder farmers who depend on agriculture to make a living and feed themselves and their families. Supporting efforts to strengthen the agricultural industry can help to combat food security, as the USAID reports that growth within that sector has been found to be at least twice as effective at reducing poverty as growth in other sectors. Much of that can be traced to the disproportionate percentage of poor people who live in rural rather than urban areas. For example, the USAID reports that 75 percent of poor people in developing nations live in rural areas.

But the poverty rate is higher in rural areas than urban areas in the United States as well. Data from the 2019 American Community Survey indicates the poverty rate in rural areas was 15.4 percent in 2019 compared to 11.9 percent in urban areas. Though recent data regarding rural poverty rates in Canada is unavailable, a 2013 discussion paper on the topic from the Government of Canada noted that the country's rural residents earned less and had lower levels of education than residents in urban areas, suggesting that poverty is likely more prevalent in the Canadian countryside than in the country's cities.

WHAT CAN BE DONE

Though food security poses a significant global challenge, lack of access to healthy foods is preventable. Individuals in rural and urban communities can voice their support for efforts to strengthen the agricultural sector. A thriving agricultural sector can ensure fewer people go to bed hungry each night and bolster the economies of rural communities that are disproportionately affected by poverty.

Career *• from page 20B*

physics en route to earning a degree that will help them become an agronomist. Mathematics also will be part of their studies, and statistics courses will be part of those studies.

• Biochemist: Biochemists study the chemical and physical principles of living things and biological processes. Within the agricultural sector, biochemists will contribute to the development of agricultural products, including those that will serve a medicinal function. Biochemistry, chemistry, biology, calculus, and physics will be part of students' courseload as they pursue degrees that prepare them for a career as a biochemist.

• Climatologist: Climatologists will figure prominently in the agricultural sector as the effects of climate change manifest themselves more readily over the next several decades. Climatologists study climate change, variability and the biosphere. Climatologists offer insight about the effects of climate change on the growth and development of agricultural products, including fruits, grains and vegetables. The natural sciences feature prominently in climatologists' educations, and students also will study meteorology as part of their coursework.

• Food scientist: Food scientists study chemistry, biochemistry, microbiology, and engineering so they can assist in the development of new food products. Food scientists may manage processing plants and some serve as researchers in an effort to solve problems related to food production.

• Plant pathologist: Plant pathologists specialize in analyzing issues related to plant diseases. Research features prominently in plant pathologists' work, and many work in university settings. Some plant pathologists work for companies attempting to develop pest-resistant plants. Advanced degrees are necessary to work as a plant pathologist, and students will study mycology, bacteriology, virology, and physiology, among other subjects, as they pursue their degrees.

The agricultural sector employs millions of people across the globe. Many of those people do interesting work as they attempt to address issues facing the agricultural sector.

How rising food demand is affecting farming

The population is growing and so is its demand for food to fuel those extra bodies. Harvard Business Review reports the global population has quadrupled over the last century. It's predicted that, by 2050, the population will exceed nine billion people.

The world is not able to feed all of its inhabitants, according to Penn State. There are more than one billion people who are estimated to lack sufficient food, and two billion who do not receive adequate nutrition. Researchers from the Institute on the Environment at the University of Minnesota concluded that, to feed the world by 2030, yields on maize, rice, wheat, and soybeans will have to rise by 60 to 110 percent. At the start of 2023, projections show them only increasing by 45 to 60 percent. There are a few reasons why food supply may not meet up with demand.

• Climate change: Climate change is predicted to cause issues to crop yields, especially in portions of the world where the population is growing the fastest. For example, a recent NASA study published in the journal Nature predicts that high greenhouse gas emissions may cause corn output to decline as early as 2030, but wheat output would increase. Farmers may need to roll with the punches and shift operations to cope with the environmental changes.

• Decreased commercial farming interest: Fewer people are working in farming. Land prices for expansion, new government mandates and regulations, and the impact of immigration and trade policies have made farming less attractive than it once was. Fewer commercial operations result in a diminished food commodity output.

• Consumer waste: Food loss and waste (FLW) is a widespread issue, posing a challenge to food security. The World Bank estimates 30 percent of all food across the globe is wasted, amounting to 1.3 billion tons of food per year. The average global household wastes 74 kg of food each year, according to the United Nations Environment Programme's 2021 Food Waste Index. Food waste is an issue that needs a solution as the world looks for ways to feed an expanding population in the decades to come.

In order to improve output, farmers have to make some changes. These can include investment in tools and technologies that enable farmers to apply nutrients more precisely and at lower cost, advises the Environmental Defense Fund. Seeds that need less water and fewer nutrients, as well as new fertilizers that are less likely to be lost to air and water, are some additional ideas. Farmers also may want to employ green practices, such as hydroponics and drip irrigation, if they haven't already, to improve efficiency and cut costs. The public also may need to petition their lawmakers to make it easier for farm workers arriving on working visas to man the fields.

Food demand continues to rise, and it has become challenging for agricultural operations to keep up.

Black vuture

• *from page 21B*

Turkey vultures are also common in Missouri, but tend to be less aggressive than black vultures, which are known to gang up and prey on calves, piglets, lambs and newborn goats. Both species are native to Missouri.

Vultures do play a critical role in the environment as scavengers of carrion, reducing the risk of diseases spreading from dead animals, Pierce said.

"While black vultures can be found all the way to Canada, I don't think that is common," said Guerrant. "Ten years ago, we rarely saw them in Missouri. Now they are in the state nearly year-round in the far south of the state. I think the warmer winters and food availability are contributing to the northward expansion of their range."

"As with other wildlife species, they will take advantage of resources that are available to them," Pierce said. "This can cause issues when it involves conflicts with human dwellings and, in some cases, livestock operations."

AT 100, Wilda Cox has seen a lot of changes since she began farming at age 11. Her father gave her a calf, Boots, pictured here. That calf would be the beginning of the well-respected "Circle J" brand. PHOTO BY LINDA GEIST

100-year-old sells farm after 'work, work, work'

BY LINDA GEIST
Missouri University Extension

CARROLLTON — Centenarian Wilda Cox knows hard work. She's built barns, lugged 110-pound cans of milk, picked and husked corn by hand and bucked hay bales.

But Cox endured no harder day than Oct. 31, 2022, when she sold the farm that had been in her family for more than a century.

Cox was born on the family farm near Bogard in Carroll County on Sept. 17, 1922. She lived there 92 years, then lived with a widowed female friend before moving to an assisted living facility recently.

The youngest of six children, Cox started farming at age 11, when her father lost a leg to disease. Her father had grown up with a series of foster parents, one of whom had beaten him so severely with a hickory switch that he would fight infections in his leg throughout his life.

Young Wilda took over many of the farming duties for her father, a sharecropper on 64 acres of land. She became the extra set of eyes, ears, hands and legs that allowed him to continue farming and take on other jobs such as setting poles for the local telephone exchange.

She became the caretaker of a team of horses during the Great Depression and after. She traveled mud roads to peddle eggs, milk and cream at the nearby Mandeville country store. During the drought of 1934, she helped dig a well by hand on the family farm. During her eight years of school, she milked cows and did other chores before and after school. "It was work, work, work," she says.

When she was 16, her dad gave her a calf named Boots. She fed it cornmeal mush and milk, and it bore three heifer calves in a row. "That put the kid in the cattle business," she says.

That Angus calf would become the backbone of the "Circle J" brand, which would later fetch

See **100-year-old**, Page 25B

IN 2015, at age 93, Wilda Cox attended MU Extension's "Pearls of Production" event for women in animal production. **PHOTO COURTESY OF MARCIA SHANNON.**

100-year-old *• from page 24B*

top prices at local sale barns.

Wilda's dad died when she was 21. She assumed the lease for the farm ground and helped her mother. A diminutive 5'2", Wilda was a gritty powerhouse, cutting wood with an axe to heat the house and shooting squirrels for their meals. By doing seasonal routines of cutting corn in the morning and cutting wood in the afternoon, she was ready for winter by Thanksgiving.

Wilda had the benefit of learning skills and resourcefulness from her father and grandfather, who was a carpenter.

Friend Randy Rodenberg recalls when he and his wife went to check on Wilda one harsh, icy winter day in the 1980s. They worried when they couldn't find her inside her home and were relieved to find her in the cattle lot caring for her animals. She had made snow treads for her boots from horseshoes.

She also learned by doing — whether learning to use a chain saw, shooting a gun or climbing a telephone pole. Her formal farm training came from reading every farm magazine she could lay her hands on. "Oh, what I haven't done ain't worth telling," she says.

In 2015, at age 93, she attended Pearls of Production, a University of Missouri Extension program for women in animal production. MU Extension swine specialist Marcia Shannon, one of the organizers, remembers that Wilda enjoyed meeting other women farmers and the hands-on sessions.

Over the years, Wilda has met a series of extension agents and specialists, most of whom she has outlived. One of them, MU alumnus Jim Heitmeyer, also 100, recently received special recognition at the annual Tweedie Agri-Business Forum for his 40 years as a livestock specialist for MU Extension.

When she was 24, Wilda Smith married James Olsen Cox, who worked on a neighboring farm and had a sawmill. They married at the church parsonage and celebrated with a noon lunch. They honeymooned that afternoon by cutting telephone poles for the local exchange. She would eventually travel three times to Arkansas, but no farther, content to be needed at home.

In 1955, they bought their first tractor, a John Deere. The bought 48 more acres in 1957 and another 288 acres in 1961. They plowed under the land's sweet clover crop and planted Sudan grass and rye for pasture and hay. In 1958, they were among the first to use artificial insemination in their cattle herd.

In the meantime, they built a herd of 80 by trading two bull calves for one heifer. They implemented a herd improvement system and maintained a detailed record-keeping system. Records of the farm's income and expenses go back to the 1800s.

While she remained the backbone of the farming operation, she credits her late husband with a keen ability to spot a good bloodline of cattle. "He didn't know sic 'em about farming. What he learned, he learned from me," she says. But he did know a good cow when he saw one, a quality that helped them build the "Circle J" brand into a sought-after commodity at local sale barns.

They were married 40 years before his death at age 67. Wilda was 64.

Farming has not been without its dangers. She's been kicked, stepped on and knocked to the ground by cows and horses. She broke a hip in 2019 and developed mouth cancer that required extensive facial surgery.

Farming today requires less physical work and more money than it did when Wilda started farming, but she offers some advice for others. "Buy little by little. Don't try to buy the whole county. Find a mentor and you have to be there," she says.

Finally, "When you plant, pray to the Lord to give you a good harvest."

She is grateful for the good harvest of a long life doing what she loves to do — farm

Reduce losses, costs when feeding hay

BY LINDA GEIST
Missouri University Extension

KIRKSVILLE — Livestock producers have options for reducing hay waste and feeding costs while improving animal behavior and performance, says University of Missouri Extension specialist Charlie Ellis.

Farmers can choose from several methods to reduce waste based on their preferences, labor availability and climate, says Ellis.

Here are four basics from Ellis:

• Right size, right place. Choose the right size and type of feeder. Match the feeder size to the herd size. Place feed on a pad or elevated surface and in a well-drained area.

• Boot out the bullies. Cull aggressive animals that push out other animals and prevent them from getting their fair share.

• Don't let food go to waste. Make animals clean up most of the hay before making more available.

• Feed hay stored outside first. This reduces spoilage and improves palatability.

Ellis calls unrolling hay the "bed-and-breakfast" of the hay world. There are several advantages to unrolling hay across a large area instead of feeding at the bunk or ring, says Ellis. "Boss" cows and timid cows have equal access. This method also reduces hoof damage

See **Feeding hay**, Page 27B

Farming • *from page 26B*

and compaction in the feeding area, can help overseed pastures with legumes and distributes nutrients back onto the ground.

Another option is to process bales. This encourages cows to eat low- to medium-quality forages. Processing allows mixing and dilution of forages of differing qualities, including high-nitrate forages.

However, bale processors have some drawbacks, says Ellis. Processors chop forages into smaller particles that dissolve easier in the rumen. This can leave cows feeling hungry and result in cows eating more food, which can mean higher feed costs. Also, processors cost $20,000-$25,000.

Different styles of bale feeders are more efficient than others. Feeder and stocking rates determine if cone or open feeders are right for each operation.

Ellis says cone feeders are the most efficient. Sheeted rings waste less than open rings, the most wasteful of feeder designs. Producers also can restrict time of access with feeders to improve body score counts, increase milk production and reduce hay waste. Finding the right feeder design improves feeder payback, Ellis says.

When limiting time for feeding, allow at least 30 inches of bunk space per cow when bunk feeding and provide one bale per 10 cows when ring feeding, he says. Divide cows into groups based on age and "pecking order." He also recommends feeding at the same time each day.

Free access encourages waste, Ellis says. Studies show that feeding daily instead reduces food costs and waste. Feed more often and waste less.

Choice of feeding ring also matters. There is less waste when feeding square bales in open rings rather than large bales in an open ring. Large round, unrolled bales fed in rings have 45 percent waste and are the least efficient, according to research done in 1973 at MU.

Considerations when buying hay:

• Test the hay to make sure it meets the nutritional needs of your herd.

• Know the hay's age, how it was stored and how it was wrapped.

• Buy hay by the ton.

For more information:

• The MU Extension publication "Reducing Losses When Feeding Hay to Beef Cattle" is available for free download at extension.missouri.edu/g4570.

• Visit the Alliance for Grassland Renewal's website at www.grasslandrenewal.org.

Tight labor market challenges farm employers to rethink compensation

BY LINDA GEIST
Missouri University Extension

PARIS — Today's tight labor market makes it harder for farm employers to compete for workers, says Ryan Milhollin, University of Missouri Extension agricultural economist.

Farm laborers work long hours, sometimes in inclement weather. Workers may need diverse skills to fill roles such as truck driver, mechanic, nutritionist, forage specialist, veterinarian, babysitter and weather forecaster. For this demanding work, farmworkers often receive pay and benefits below those offered in other industries.

To help farms attract and retain workers in this environment, Milhollin recommends considering nonmonetary compensation.

"Farm employers can use nonmonetary compensation to tap into what makes working on a farm unique and provide an inexpensive yet meaningful benefit to farm employment," says Milhollin, an author of MU Extension's Missouri Farm Labor Guide.

Benefits could include free housing, hunting privileges on farmer-owned land and continuing education opportunities. Milhollin says the key is getting to know your employees and what they enjoy. Choosing benefits you know the farm team will value will have a greater impact on retaining team members.

Lynn Fodge, of Hopewell Farms in Monroe County, says she, her husband and their two sons and their spouses try to show their deep appreciation for their two farm employees, Trevor Cockrell and Dakota Beckfield. The Fodges farm about 5,000 acres of row crops and pasture and have 550 head of fall- and spring-calving

See **Labor**, Page 29B

Workshop tells how and why to renovate tall fescue pastures

BY LINDA GEIST
Missouri University Extension

COLUMBIA—Forage and beef producers can learn from world-renowned forage experts the how and why of renovating toxic tall fescue pastures at a March 23 workshop in Mount Vernon.

"This one-day workshop focuses on managing tall fescue toxicity and integrating novel tall fescue varieties into a grazing system," says Craig Roberts, state forage specialist with University of Missouri Extension. "Toxic tall fescue reduces livestock weight gains and lowers reproductive performance and profits."

Roberts says local producers, company representatives, extension specialists, government workers and researchers from across the country will speak. They will discuss symptoms and causes of fescue toxicosis, establishment and first-year management, seed and endophyte testing, transitioning from toxic fescue, products and more. Speakers will also give information on incentives and cost sharing.

Speakers and topics:

• Tall Fescue Toxicosis: Symptoms and Causes, Craig Roberts, MU Extension.

• Toxicosis Management, Craig Roberts and Gene Schmitz, MU Extension.

• Understanding Endophytes, Carolyn Young, North Carolina State University.

• Establishment and First-Year Management, John Andrae, Clemson University.

• Seed Quality and Testing, Gene Schmitz, MU Extension.

• Drill Calibration, Matt Massie, MU.

• Plot Tours, Matt Massie, MU.

• Economics, Matt Poore, North Carolina State University.

• Cost Share and Incentive Programs, Jamie Kurtz, USDA Natural Resources Conservation Service.

• Novel Endophytes on My Farm, various producers.

The Alliance for Grassland Renewal and its partners sponsor the workshop, which will be at the MU Southwest Research Center, Mount Vernon. Register at TallFescueMO23.eventbrite.com.

Labor • *from page 28B*

Angus cows.

The Fodges communicate their appreciation by thanking the workers for their many efforts, giving bonuses when sales are good and offering meat and other products of the farm. They also provide some insurance benefits and a retirement plan.

Other perks include being able to borrow farm equipment, trucks and tools for personal use. The farm allows flexibility in work hours to accommodate family time, school schedules and community events.

Hopewell Farms' two employees came to them by chance meeting and word of mouth. Neither had extensive agricultural backgrounds, so the Fodges trained them. Cockrell has worked on the farm for 12 years, and Beckfield joined the team eight months ago.

"We know there is too much work for the family without them," says Lynn Fodge. "We depend on them, and we are grateful for them."

Farmhands once were a fixture of farmsteads. Now, like farmers, they are a vanishing breed, she says. Fewer young people want to return to the farm, and there are financial obstacles to entering the industry.

Wages for farmworkers are rising at a slower pace than nonfarm wages, according to the USDA Economic Research Service. In 2020, the average farm wage was $14.62 per hour, just 59 percent of the nonfarm wage ($24.68). And the hired farm workforce is aging — another obstacle for those seeking employees.

For more information on how to attract and retain farmworkers, download the free "Missouri Farm Labor Guide" at extension.missouri.edu/m199.

TREVOR COCKRELL, (photo opposite page) a 12-year employee of Hopewell Farms in Monroe County, feeds cattle as part of his work to keep the beef and grain operation running smoothly. The owners, the Fodge family, rely on their employees to keep the 5,000-acre operation going.

PHOTO COURTESY OF LYNN FODGE

Technology inches farming toward autonomy

BY LINDA GEIST
Missouri University Extension

COLUMBIA, Mo. – Armchair farming may not be here yet, but it's getting closer.

"Autonomy in agriculture isn't as far away as you think," says Kent Shannon, University of Missouri Extension agricultural engineering specialist.

Agriculture is rapidly shifting to technology that can increase land efficiency, reduce labor shortages and streamline food production, says Shannon.

Imagine a world where tractors and combines can run without a driver all day and all night, he says. Autonomous tractors won't clock out at the end of the traditional workday or call in sick.

A new generation of farmers raised on technology is moving the industry ahead at a quickening pace. Shannon points to the use of GPS-guided tractors and combines with autosteer. In 2005, only 6 percent of farmers used this technology, compared to 85 percent in 2022. Likewise, more than 70 percent of farmers began using GPS-enabled sprayer booms

See **Autonomy**, Page31B

Autonomy • *from page 8B*

with nozzle control since 2010. Other precision technologies gaining popularity include fleet tracking, scouting with mobile devices and predictive models for treating pests.

Half of dealers are using telemetry to share information among applicators to office locations. More than two-thirds of dealers offer precision soil sampling, yield monitor analysis, satellite or aerial imagery, VRT (variable rate technology) fertilizer and lime applications and VRT seeding prescriptions. One of the largest growth areas is using drones for precision pesticide application.

Croplife magazine reported these results(opens in new window) in its July 2022 issue after Purdue University surveyed cooperatives, independent retailers and others in the Midwest.

Nitrogen management is one of the areas where new technology can most benefit farmers, says Shannon. Computer-driven application rates that are site-specific let growers apply fertilizer where needed and – just as importantly – not apply it in areas where it would not benefit the crop. Computer-aided planting helps in avoiding skips.

Tractors are becoming more versatile, with interchangeable chassis compatible with different brands of existing equipment. Smaller, lighter tractors reduce compaction.

There are numerous issues to consider as technology evolves, Shannon says. How will farm equipment travel on rural roads? How will farm liability insurance differ for autonomous equipment?

For more information, contact Shannon at shannond@missouri.edu or follow him on Twitter at twitter.com/GPSMUTiger.

Weeds adapt to fight back against herbicides

BY LINDA GEIST
Missouri University Extension

COLUMBIA — Weeds today aren't like "what Mom used to make," says University of Missouri Extension weed scientist Kevin Bradley.

Today's weeds know how to fight back against long-used herbicides and adapt in ways that spell trouble in production agriculture, says Bradley. Officially, Missouri already has 11 different herbicide-resistant weed species. Waterhemp and Palmer amaranth, both weeds in the pigweed family, rule the roost when it comes to resistant weeds in Missouri, he says.

Resistant weeds are fast outpacing the development of new herbicides. It's not just resistance running amok; it's the type of resistance that concerns Bradley. "Some of the mechanisms responsible for resistance in these weeds like waterhemp and Palmer amaranth aren't like anything we've seen before," he says.

Herbicides focus on specific enzymes that bind to target sites. Historically, weeds have adapted through mutations in their internal enzymes that result in changes to the those target sites. This has been one of the most common resistance mechanisms identified in weeds for the past several decades.

More recently, weeds have been increasingly developing metabolic-based resistance, or non-target-site resistance, which lets plants convert the herbicide's active ingredient into inactive metabolites that don't kill the plant. Worse yet, metabolic resistance can confer resistance to other herbicides within the same chemical groups and perhaps even to herbicides in other groups. It's possible that metabolic resistance can confer resistance to new herbicides that have never been sprayed in that field. This makes weed control even more unpredictable and concerning, says Bradley.

"Unfortunately, the trend with resistant pigweeds like waterhemp and Palmer amaranth right now is metabolic resistance," says Bradley. "When weed scientists have investigated the 2,4-D, dicamba or group 15 resistant pigweed populations that have been found in some states in recent years, they have found metabolic resistance mechanisms in these weeds more often than not," he says.

"Keep mixing and rotating herbicide sites of action, but remember, herbicides alone aren't a silver bullet to solve the resistance problem."

Meanwhile, Bradley is studying other ways to control weeds and prevent weed seeds from returning to the soil. Methods include weed electrocution and a seed destructor that crushes seeds during harvest. Bradley says that it is going to take more than herbicides alone to solve this problem with resistant weeds.

Visit weedscience.missouri.edu for more information.

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