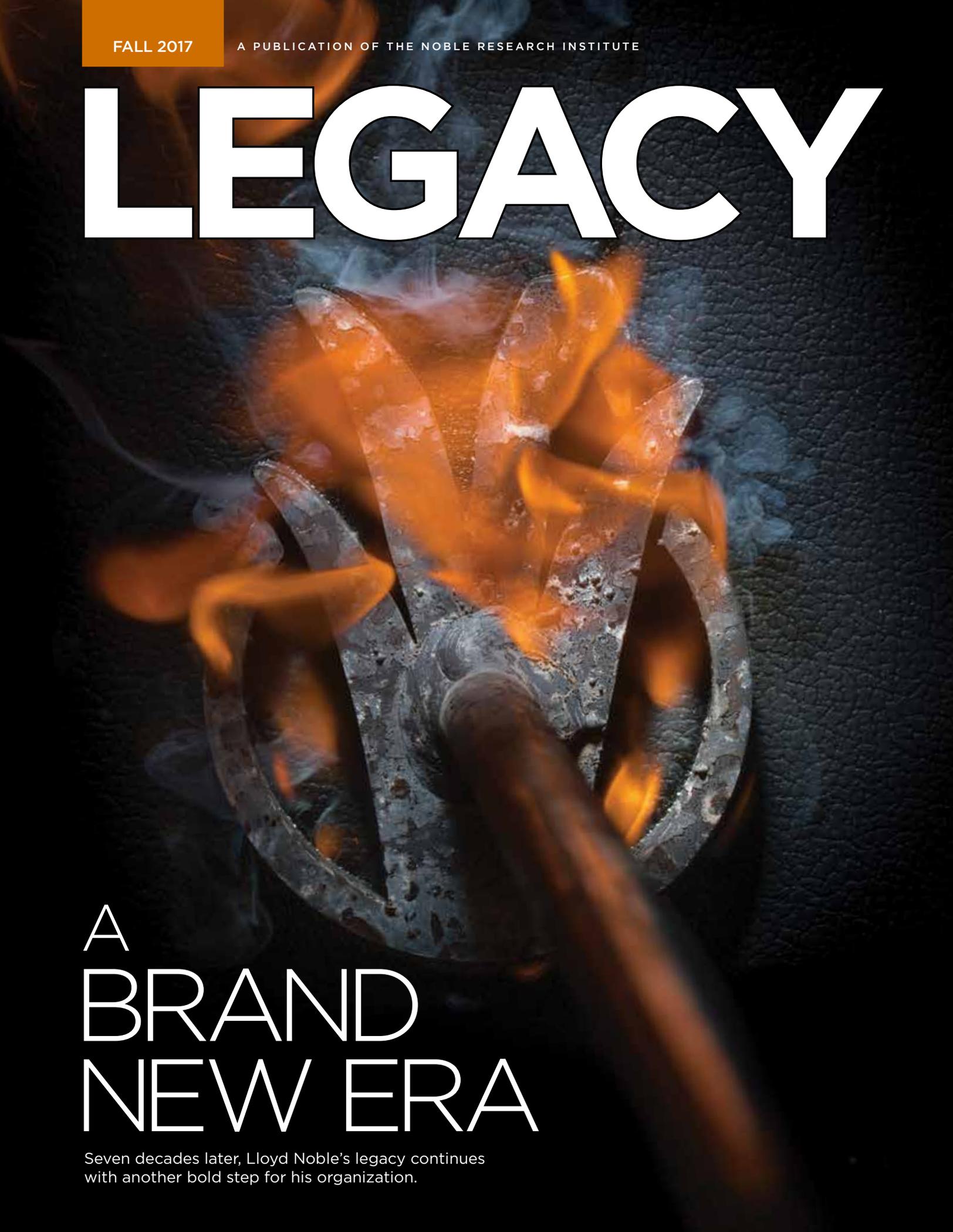


FALL 2017

A PUBLICATION OF THE NOBLE RESEARCH INSTITUTE

LEGACY



A BRAND NEW ERA

Seven decades later, Lloyd Noble's legacy continues with another bold step for his organization.

LLOYD NOBLE SCHOLARS IN **PLANT SCIENCE**

- Biochemistry
- Bioinformatics
- Genetics/Genomics
- Molecular Biology
- Plant Physiology
- Plant Pathology



Paid
internship



Housing
offered

APPLY ONLINE BY FEB. 6

ONE NOBLE SUMMER IS ALL IT TAKES

Apply and learn more at www.noble.org/summer-scholar

CONTENTS

16

A LIVING LEGACY

Ten years ago, the Noble Research Institute introduced a new magazine but not without overcoming an obvious problem first.

18

A BRAND NEW ERA

Lloyd Noble didn't hesitate when he sought a solution to revitalize agriculture in southern Oklahoma following the Dust Bowl. Seven decades later, his legacy continues with another bold step.

30

FROM THE ARO ARCHITECTS

They needed an act of Congress to create a new avenue for funding agricultural research. Find out how they made it happen.

32

THE 40-YEAR-LONG LOOK

The longest-tenured agricultural consultant revisits the organization's past and progression.

33

WHERE I CAME IN

The new guy reflects on a historic change made after only three days on the job.



34 FUNDING THE ANSWERS TO FARMERS' QUESTIONS

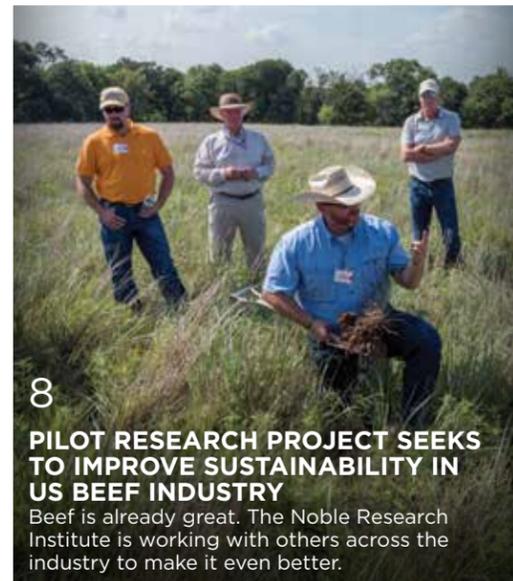
U.S. farmers produce the world's most abundant food supply, thanks, in part, to technological advancements. But with shrinking public funds available for agricultural research, new solutions are needed for funding continued innovation. Society depends on it.

Much of the Noble Research Institute's agricultural research ties back to forage-based cattle production, whether the aim is to better understand basic plant functions, to breed improved forage varieties or to optimize whole-systems approaches of managing land.

4 INNOVATIONS IN AGRICULTURE
Find out what's new in agricultural technology.



5 DRONES ON THE FARM
The Noble Research Institute is testing out drones and drone-based sensors as part of its research and farming and ranching operations.



8 PILOT RESEARCH PROJECT SEEKS TO IMPROVE SUSTAINABILITY IN US BEEF INDUSTRY
Beef is already great. The Noble Research Institute is working with others across the industry to make it even better.

42 CANNING TOMATO SALSA USING A HOT WATER BATH
Preserving excess garden produce is easy with these step-by-step instructions.



6 AG TOOLS ON THE GO
Here is farmers' and ranchers' go-to app for making decisions in the field.

9 NATIONAL INITIATIVE EVALUATES SPECIES FOR SOIL HEALTH
Cover crops hold great potential to improve soil health. But first, researchers have some questions.



10 THREE THINGS TO LOOK UP
In case you missed the latest on agricultural research funding, soil health and rye.



LEGACY

Fall 2017 | Vol. 11, Issue 1

Bill Buckner
PRESIDENT/CEO

J. Adam Calaway
EDITOR/WRITER

Rachael Davis
GRAPHIC DESIGNER

Rob Mattson
PHOTOGRAPHER

Courtney Leeper
COPY EDITOR/WRITER

Laura Beil
WRITER

Robyn Peterson
WRITER

Shane Porter
WEB

CONTRIBUTING WRITERS

Dan Childs, Mike Komp, Jeff Moen, Shane Porter, Steve Rhines, Tim Woodruff

Legacy is published by the Department of Communications at the Noble Research Institute. Headquartered in Ardmore, Oklahoma, the Noble Research Institute is an independent, nonprofit agricultural research organization dedicated to delivering solutions to great agricultural challenges. *Legacy* offers insight into the outstanding scientists and agricultural consultants who pursue the vision of founder Lloyd Noble.

Reprints: Reprint requests may be made by contacting J. Adam Calaway, Director of Communications, at 580-224-6209 or by email at jalcalaway@noble.org.

No-cost subscription/address change: *Legacy* is provided at no cost to the general public as a courtesy of the Noble Research Institute. To receive a copy of the magazine or to change your mailing address, please email jalcalaway@noble.org. Electronic subscriptions are also available by visiting www.noble.org/subscriptions.

Noble Research Institute, LLC
2510 Sam Noble Parkway
Ardmore, Oklahoma 73401
580-223-5810 (general information)
580-224-6209 (media)

ISSN: 1939-5035



Copyright ©2017. All rights reserved.

BEYOND THE FARM BILL

Next year, the Agricultural Act of 2014 (more commonly known as the farm bill) will expire, meaning negotiations for the new bill are in full swing.

Politicians, commodity groups, lobbyists and, well, practically anyone attached to the agriculture sector are sharpening their talking points and preparing their social media campaigns. What's at stake? A slice of the \$457 billion federal budget pie.

For those who may not know, the farm bill is - in simplest terms - a multiyear bill that governs agriculture and food programs. The first farm bill was passed by Congress in 1933 as part of former President Franklin D. Roosevelt's New Deal. The goal of the original legislation was to provide assistance to farmers struggling through the Great Depression.

Through the decades, the farm bill has continued to morph, grow and, of course, become more complex. With each iteration comes more subjects, and more subjects create more conflict.

Disagreement is not bad. Working through conflict can even be beneficial. However, farm bill negotiations often devolve into *Game of Thrones*-esque feuds, where interrelated groups become locked in needless turf wars.

This negotiation process inevitably drags our perspectives backward. We end up focusing on the different factions of agriculture instead of keeping our perspective toward the future and the obstacles we must overcome in the 21st century. We should be challenging the status quo and devising new solutions instead of rehashing old policies.

Let's move past seeing the farm bill as anything more than a piece of government legislation. It is helpful, but it is not the ultimate answer. By placing our hope solely in government funds, we demonstrate the narrowness of our perspective and limit potential avenues of action.

Let's paint a different picture for American agriculture - one that is derived from informed thinking not rooted in limited perspectives of the 1930s or today's emotion-driven dogma disguised as facts. Today's policies can generate innovative solutions for tomorrow if we think differently.

Let's build a farm bill that enhances rural communities and lays the groundwork for future discoveries. Let's base the farm bill on four common sense pillars: a safety net for farmers, conservation, trade, and research and technology.

Surely there is a need to protect farmers' interests beyond traditional insurance. They are the caretakers of our land and the protectors of our food supply. Helping them survive is an unquestionable mandate. But we must also be willing to sacrifice outdated spending practices just like we moved past the mule-drawn plow.

The needs of the agriculture sector have changed, and questions facing our producers are more complex than ever before. How do we grow more food and fiber with less inputs, water and land? Can we improve our ecosystems while still pulling sustenance from them? How do we handle climate shifts, sequester carbon and ensure healthy watersheds?

The answers are not found by repeating yesterday's mistakes. They are found in collaboration, hard work and making a case for how funds should be used for 21st century agriculture. They are waiting for us in the depths of research, in the newest technology and in the next discovery. But we must work for them together.

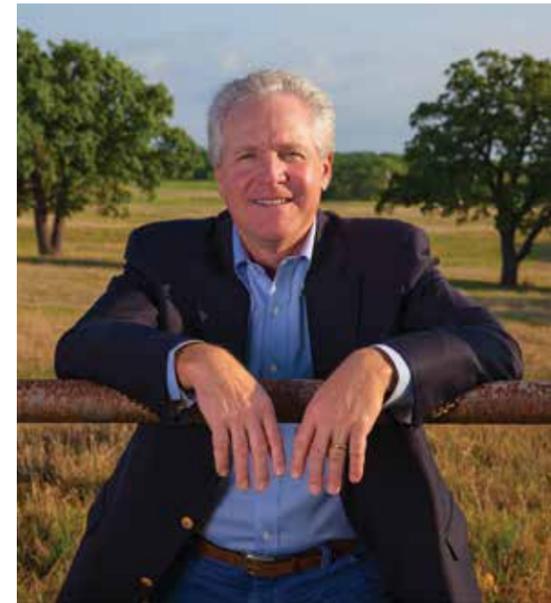
We must dive into the soil below our feet and understand the teeming life therein. An unseen world awaits us, one that holds the potential to not only serve as the foundation for food production but sequester carbon, provide clean water and build new market opportunities.

We must view the natural resources around us as part of a complex system that requires us to understand and participate with it, not control it. And we must keep our eyes on the horizon, looking to identify and shape trends that will become tomorrow's usable tools.

How do we fund all of these grand ideas, you ask? A new vision requires new visionaries.

The development of the agricultural research organization (ARO for short, see story on page 18) can serve as a new nonprofit vehicle for individuals or families who want to commit their wealth for the conduct of agricultural research.

The creation of just one new ARO could



spur innovation toward a specific agricultural challenge or reshape a region just as the Noble Research Institute has impacted the Southern Great Plains. A dozen or more new AROs could dramatically impact agricultural productivity across the country and around the world.

All that is needed is bold men and women with a passion for a cause, like our founder, Lloyd Noble, who saw the land destroyed after the great Dust Bowl and sought a lasting answer. This new generation of Noble-like philanthropists can ignite action with their resources and spark innovations that ripple for generations. It is time for them to step forward and use this new tool to revolutionize agriculture.

A handful of these pioneers can complement and build capacity over and above what the government supplies. We can finally achieve food security, environmental stewardship and economic prosperity. But we must change our thinking, and we must focus on tomorrow not the past.

Otherwise, I'll be writing these same words again in four years.

Sincerely,

BILL BUCKNER, PRESIDENT AND CEO

IN EVERY ISSUE	President's Message 3	What's Online 11	Calendar of Events 46	Before You Go 48
----------------	-----------------------	------------------	-----------------------	------------------

ON THE COVER: Since cattle are a Noble Research Institute focus, creative staff wanted to illustrate the organization's "brand" new era by playing on a cattle branding concept. Paul Doughty, landscape supervisor, used a blow torch to heat a laser-cut, logo-shaped steel branding iron. Safety coordinator James Rutledge stamped the hot brand into leather, and photographer Rob Mattson had seconds to capture the perfect image before the flames died out.

4 INNOVATIONS IN AGRICULTURE

Check out some of the latest ways technology is used in agricultural production and land management.



1 Drones in Agriculture

You've probably heard a lot about drones lately. From Amazon deliveries to aerial photography, and even pesky neighbors, drones have definitely been making headlines. You might not realize how these unmanned aerial vehicles (UAVs) are being used in agriculture.

These tiny machines have potential to become the farmer's eye-in-the-sky, collecting data that helps them do their jobs better. Ag drones can identify types of trees, measure the size of ponds, inspect the health of crops and herds, and much more. The sky is the limit with this new technology.

Check out page 5 to learn from Mike Komp, spatial technology services manager, how we're using drones and drone-based sensors in our agricultural research.

 [For more information](#)

www.noble.org/uavs

2 Learning Robotics

Is it the future yet? Well, if robots being used in agriculture are any indication, the year 2017 has brought us into the space age of plant science.

Frank Hardin, Ph.D., youth education manager, recently spoke about the potential of robotics in agriculture at the Global Conference on Educational Robotics in Norman, Oklahoma. During the conference, students from around the world competed in the International Botball Tournament. This year's game theme was "Robots Assisting a Modern Agricultural Operation." Check out our blog post featuring the brilliant young minds of robotics and even a cameo of the famous Noble blue cow.



 [Read the full article](#)

<https://www.noble.org/botball-meets-ag/>



3 Calf Book App

Good record-keeping is vital for any business. Farmers and ranchers are no exception to this rule. An app called Calf Book is helping cow-calf producers keep better records.

This app, developed by EDJE Technologies, offers a replacement for notes and scrap paper by providing ranchers with an easy interface for storing all sorts of relevant data at a low monthly rate. One of the advantages of this app is that it works entirely offline, which makes it perfect for rural situations. With breeding stats easily at hand, Calf Book could be very useful to the modern cattle breeder.

 [See the in-depth review](#)

www.noble.org/calf-book

4 Putting Tracking Collars on Feral Hogs

Why is the Noble Research Institute putting collars on hogs? Believe it or not, it's a big deal because feral hogs cause approximately \$1.5 billion in damage each year, destroying crops and native habitats. Wild pigs were originally imported as a food source, but some escaped domestication or were outright released.

Noble employees and graduate students from Mississippi State University, Oklahoma State University and Texas Tech University have collaborated to build accelerometer and GPS-equipped collars to track wild pig behavior and movement. This data will help us better understand how to control populations, reduce damage to agriculture and prevent the spread of pathogens.



DRONES ON THE FARM

Unmanned aerial vehicles and the sensors associated with them have potential as a tool for farmers and ranchers. We're testing them out.

by Mike Komp, spatial technology services manager

There's plenty of buzz about drones and sensors in agriculture today. Farmers and ranchers hear about the technology but may have questions about if they should adopt it or how, especially considering how many companies and products are out there.

At the Noble Research Institute, we're working to incorporate drones and sensors into our research and farming/ranching operations so we can better understand the potential of some of these devices.

What are drones and drone-based sensors?

Drones, more formally known as unmanned aerial vehicles (UAVs), are flying machines that someone on the ground can use to collect images from the air. These images range from simple - similar to those you could take from an airplane - to extremely complex and data-rich. These complex images are generally gained through the use of sensors that are attached to the UAVs. Different sensors can capture various information, such as forage quality and rainfall amounts.

Why would a farmer or rancher want to use this technology?

There are many potential applications of drone technology. Simple UAV cameras could help a producer locate and count equipment, animals, or hay bales. They could assist in controlling prescribed burns, checking fences and water sources, inspecting fields, or identifying trees (like pecan) from other vegetation. More complex sensors could allow producers to estimate the amount of water in a pond and estimate the quantity and quality of forage plants available for grazing livestock.



Spatial technology staff use drones to survey a new orchard at the Noble Research Institute's McMillan Farm on Feb. 28, 2017.

How are drones and drone-based sensors used at the Noble Research Institute?

We started using drones in 2014 as part of our cotton root rot research. The large-scale images and data we were able to collect allowed researchers, like Carolyn Young, Ph.D., and Chakradhar Mattupalli, Ph.D., of the Noble Research Institute's mycology lab, to better study the spread of cotton root rot disease in alfalfa fields.

We also measure plant health using sensors that measure the normalized difference vegetation index (NDVI). One device we've been pleased with for this purpose is Sentera's Standard NDVI Single Sensor. This sensor is small in size and relatively inexpensive compared to other sensors used for similar measurements. We've successfully used this sensor to identify bare ground in pasture and range, monitor plant growth in alfalfa trials, and identify areas of cotton root rot. As you can see, the applications of this technology are broad and can impact research across many disciplines within agriculture at the Noble Research Institute.

What is the state of this technology today and potential for the future?

Interest is growing and there are producers using this technology, but it is not commonly used right now. It can be expensive to buy a drone and the additional sensors, and there are other fees associated with storing data. Anyone who flies a drone for business purposes must be certified with the Federal Aviation Administration (FAA) as a remote pilot and must comply with restrictions on when, where and how the drone is operated.

As with any decision, producers must decide if the benefits outweigh the costs before they choose to adopt the technology. Overall though, the future of drone-based sensors in agriculture is promising as data can be integrated into precision agricultural equipment more easily with clear expectations for increased return on investment. 🌱

What agricultural technologies are you interested in knowing more about? Send your questions to legacy@noble.org.

AG TOOLS ON THE GO

Farmers and ranchers now have a mobile tool for more easily making decisions in the field.

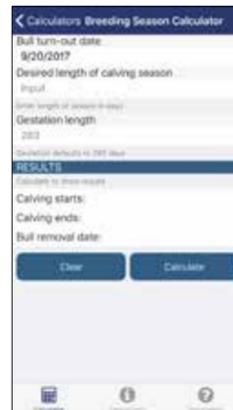
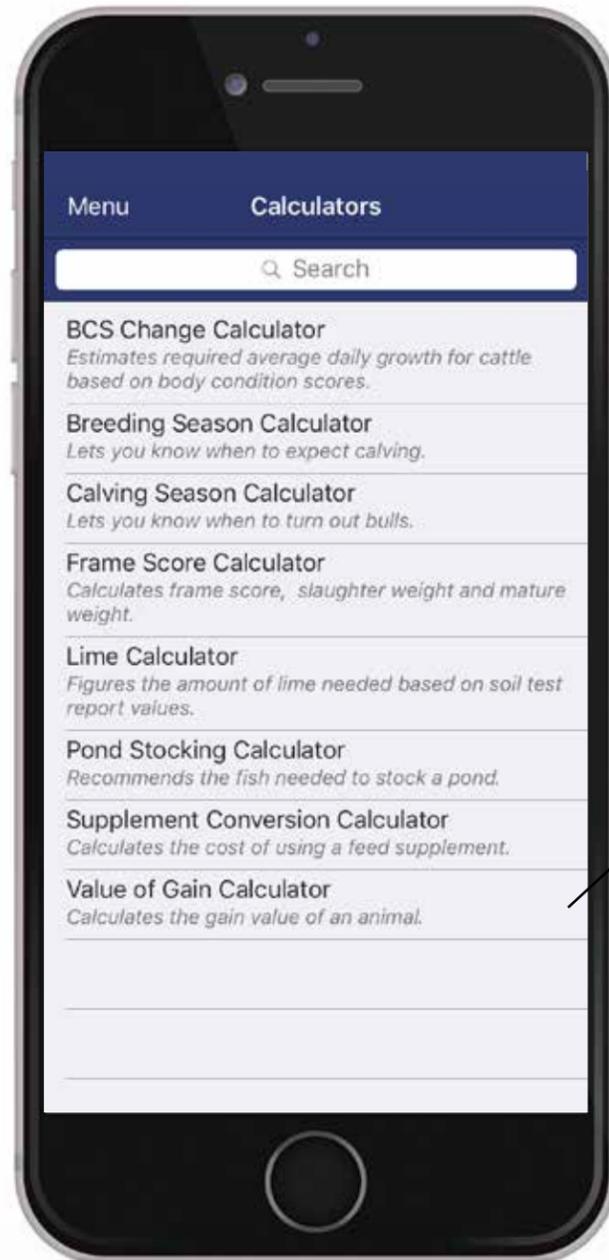
Farmers and ranchers make important production decisions out in the field every day. To help them, the Noble Research Institute has offered numerous online calculators since 2005. With technology changes, many of those original calculators no longer work on modern browsers or mobile devices. In August 2016, a free application called "Ag Tools" was made available for both iOS and Android devices. Now farmers and ranchers can gain information while making routine decisions on the go.

The app currently offers

13

CALCULATORS:

- Body Condition Score Change
- Breeding Season
- Calving Season
- Frame Score
- Lime Application
- Pond Fish Stocking
- Supplement Conversion
- Value of Gain
- Boom Sprayer Calibration
- Boomless Sprayer Calibration
- Dry Fertilizer
- Orchard Sprayer Calibration
- Planter Calibration



DOWNLOADS

You can download "Ag Tools" from the App Store and Google Play.

iOS:
bit.ly/ag-tools

Android:
bit.ly/ag-tools-android

More calculators online! We also provide the following calculators on our website at noble.org/tools: Cow Calf Net Returns, Dry Fertilizer Calculator and Hay Ring Waste Calculator.



AQUATIC PLANTS ADDED TO NOBLE PLANT IMAGE GALLERY

The Noble Research Institute Plant Image Gallery is designed to help farmers and ranchers, botanists, ecologists, natural resource managers, educators, and hobbyists identify plants commonly found in the Southern Great Plains.

The Plant Image Gallery includes numerous images of species in the following categories: grasses and grasslikes; forbs; and trees, shrubs, and woody vines. Now, the gallery also includes aquatic vegetation.

Aquatic vegetation management is an important part of the ecosystem for land managers who are interested in properly stewarding ponds, wetlands, creeks and rivers, and other bodies of water. The plants featured in the aquatics category are from the Noble Research Institute's newest pictorial guidebook, *Common Aquatic Vegetation in the Southern Great Plains*.



See more photos online

See the gallery at www.noble.org/plantimagegallery



G.C. Ellis (center) shares how the G Bar C Ranch in Cooke County, Texas, views sustainability during McDonald's Sustainability in Action tour, June 15, 2017. G Bar C Ranch is one of the Integrity Beef Alliance members that will raise cattle for the pilot sustainability research project.

Pilot research project seeks to improve sustainability in US beef industry

This spring, the Noble Research Institute, Integrity Beef Alliance, Beef Marketing Group (BMG), Tyson Foods, Golden State Foods and McDonald's USA initiated a two-year pilot research project that will seek methods to improve sustainability across the entire beef value chain, test metrics established by the U.S. Roundtable for Sustainable Beef, and explore scalable solutions that could be applicable to beef production across the country.

Each of the five organizations involved in the project represent a different step in the beef production chain.

The Noble Research Institute, the largest independent agricultural research organization in the United States, will coordinate and provide project management services for the overall project.

"We find great value for the Noble Research Institute to be part of a complete beef value chain, multistakeholder program," said Chad Ellis, project coordinator. "Our understanding of cattle producers' needs combined with the other collaborators' perspectives will help us refine the whole system of bringing beef to the table."

Ranchers who are part of Noble's Integrity Beef Alliance will raise the cattle for the project. The Integrity Beef program emphasizes progressive management methods, ranch stewardship and humane care of all livestock. BMG will feed the cattle in one of their feedyards in Kansas. BMG, which has been at the forefront of the sustainability effort, is a cooperative that works with local farmers, cow-calf producers, stocker operators and auction markets to maximize efficiency not only in their feedyard but across the entire value chain. BMG will send the cattle to Tyson Foods for harvesting. Some of the meat will then go to Golden State Foods, which supplies McDonald's with some of the 100 percent beef patties served at its restaurants.

The Integrity Beef Alliance 2017 spring calves will transition into the feeding sector in early December. "This process may seem slow, but it's important for us not to rush Mother Nature when raising cattle," Ellis said. "Taking the standard amount of time to evaluate the value chain from both the producer and manufacturing sides will allow us a better picture of what it takes to reach our end goal – supplying beef to the consumer." 🌱

National initiative evaluates cover crop species for soil health

The Foundation for Food and Agriculture Research (FFAR) and the Noble Research Institute launched a national cover crop initiative during a special press conference at the National Press Club in Washington, D.C., this spring.

The \$6.6 million research initiative will promote soil health through the development and adoption of new cover crops across the United States.

The focus of the initiative will be to identify cover crop species with the greatest potential to improve soil health and evaluate such species over a broad geography within three groups: small grains (wheat, rye, oat and triticale), annual legumes (hairy vetch, winter peas and clovers), and brassicas (turnips, radishes, kale and mustards).

The initiative will bring together many collaborators, including representatives from the seed industry; U.S. Department of Agriculture Agricultural Research Service (ARS); Natural Resources Conservation Service; three land-grant universities; and an existing Legume Cover Crop Breeding Team, comprising another six land-grant universities, ARS sites and a producer network.

The cover story for the winter issue of *Legacy* (out in December 2017) will focus on cover crops, examining the research aimed at developing stronger varieties and the collaborations driving innovation in the sector. 🌱



Sunn hemp grows at the Noble Research Institute as part of a cover crop trial led by Jim Johnson, a soils and crops consultant.



Students from across Oklahoma demonstrated their knowledge of natural resource topics during the hands-on 2017 Oklahoma Envirothon competition.

Ninnekah wins 2017 Oklahoma Envirothon, competes at nationals

The Ninnekah High School team placed first at the third annual Oklahoma Envirothon competition held in March at the Noble Research Institute.

The winning team members were: Kaylee Crutchfield, Dakota Dinsmore, Kailee Fitzpatrick, Ethan Mann and Caden Smith. The team adviser was Connie Taylor.

The Oklahoma School for Science and Mathematics "B" team placed second, and the Southern Oklahoma Technology Center team placed third.

During the competition, students rotated among four stations that focused on aquatic ecology, forestry, soil and wildlife. Each station included a written test based on the discussions. Each team also gave a presentation on agricultural soil and water conservation stewardship, this year's special topic.

The Institute sponsored the Ninnekah team as they represented Oklahoma at the North American competition on July 23-29, in Emmitsburg, Maryland. The students toured several different agricultural operations, such as orchards and dairy farms, to gain new experiences. "The students learned that competition is fierce and what is required to place at the international level," said Connie Taylor, Ninnekah Envirothon team adviser. "The knowledge acquired from the training sessions and state competition will be very valuable to the students in future competitions. We are grateful for the opportunity to compete and thankful to the Noble Research Institute for the sponsorship." 🌱

State leaders collaborate to enhance conservation

A new statewide collaboration was officially launched in April during a special signing before the annual Lt. Governor Turkey Hunt kickoff luncheon at the Oklahoma History Center in Oklahoma City. This effort focuses on three collaborative objectives: enhance the development of conservation in Oklahoma, coordinate research and coordinate communication.

The task force is comprised of eight organizations, each dedicated to natural resource stewardship: Noble Research Institute; Oklahoma Conservation Commission; Oklahoma State University's Division of Agricultural Sciences and Natural Resources; Oklahoma Association of Conservation Districts; U.S. Department of Agriculture Natural Resources Conservation Service; Oklahoma Department of Agriculture, Food and Forestry; Oklahoma Department of Wildlife Conservation; and Oklahoma Tribal Conservation Advisory Council.

The task force held a Conservation Summit in August to identify and address major state conservation goals, develop models of success for specific topics, and develop informational resources and messaging to provide critical information to the general public, those involved in conservation, and the next generation. Oklahoma Congressman Frank Lucas opened the Summit with a national perspective of conservation policy. Individuals and organizations engaged in conservation worked together to address the state's conservation issues.



Craig and Mori Watson received the 2017 Leonard Wyatt Outstanding Cooperator Award at the Texoma Cattlemen's Conference on Feb. 24, 2017.

Watson recognized for ranching accomplishments, willingness to help other producers

The Noble Research Institute presented Craig Watson of Sherman, Texas, with the 2017 Leonard Wyatt Memorial Outstanding Cooperator Award this spring.

Watson is a small-scale progressive producer who uses all the information and resources available to make informed decisions about his land and enterprises.

"He manages every aspect of his operation as a business while improving the land he owns and operates," said Hugh Aljoe, Noble Research Institute director of producer relations.

3 Things to Look Up

Funding the Next Green Revolution

How much federal funding should agricultural research receive? This is a question debated on Capitol Hill. In the meantime, new methods are being explored to raise the needed money for effective study.

In this *DTN/The Progressive Farmer* article, Jim Patrico points out the glaring need for better funding. He also talks about the formation of agricultural research organizations (AROs) as a tax strategy and one answer to the need for funding. This article explains some of the reasons for our interest in pursuing ARO status.

View the full article at: bit.ly/2xM7cFW

National Soil Health Action Plan

After many discussions among farmers, ranchers, scientists, industry leaders, government agency leaders and nongovernmental organizations, the Soil Health Institute has unveiled its plans for advancing soil health across the U.S. The plan includes priorities in research, measurement, standards, assessment, economics, communications, education and policy.

See the plan and watch a recording of the announcement from May 18, 2017, at: bit.ly/2eCa0IM

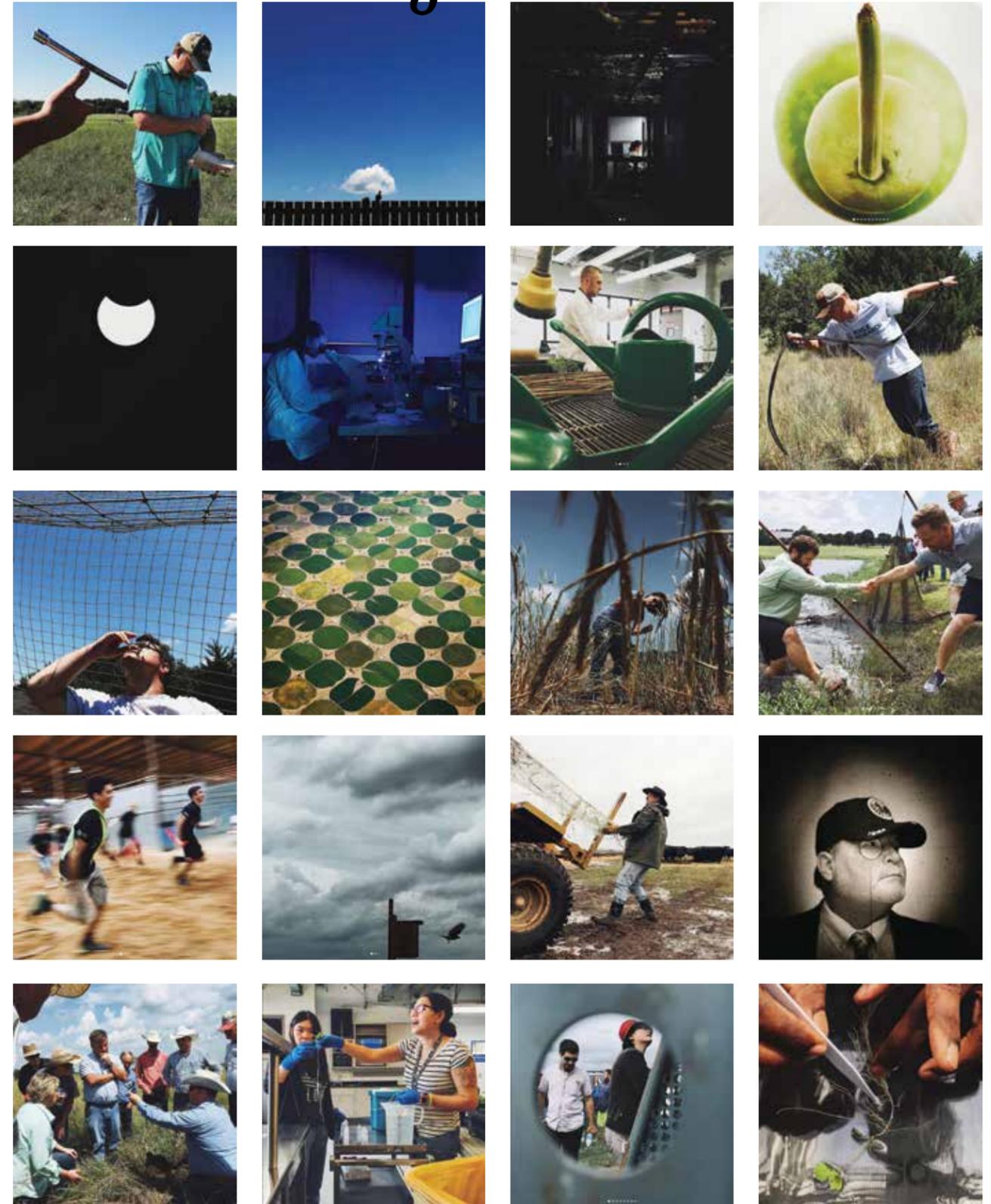
Rye: The Underappreciated "Poverty Grain" Enjoys a Renaissance

Oklahoma is the number one producer of rye in the nation, and the small grain has recently received more attention as a cover crop and for craft breweries and whiskey distillers. Many of the most popular rye varieties, including the industry standard Elbon, were developed at the Noble Research Institute.

Learn more from Mike Trammell, senior plant breeder, as part of an NPR StateImpact program at: n.pr/2swcxPk

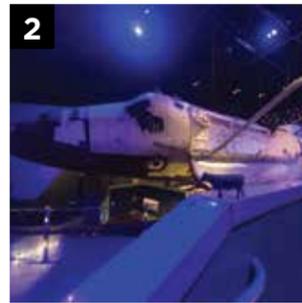
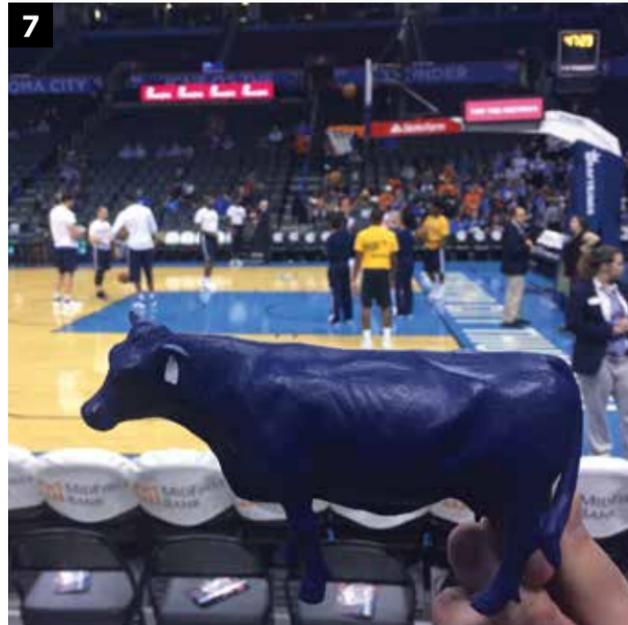
Follow us on Instagram

@nobleresearchinstitute



Where in the world is the BLUE COW?

The blue cow has crossed seas and wild terrain, relaxed in some of the world's most beautiful places, and met great people doing important work for science and agriculture.



1. "Legacy of Ranching" exhibit in Dallas, Texas, *Jennie Hodgen*
2. Kennedy Space Center, *Jin Nakashima*
3. Magnolia Farms in Waco, Texas, *Karen Lee*
4. Vabbinfaru Island, Maldives, *Shelley Mullins*
5. Canyon Cove Beach in the Philippines, *Gwen Pascua*
6. Johann Strauss monument in Vienna, Austria, *Jin Nakashima*
7. Oklahoma City Thunder game, *Shane Porter*
8. Golden Gate Bridge in San Francisco, California, *Wolf Scheible*
9. Antigua, Guatemala, *Maria Monteros*
10. Lake Murray State Park in Ardmore, Oklahoma, *Shane Porter*

f @bluecow Keep up with the blue cow's adventures at www.facebook.com/bluecow, and continue to post your blue cow photos using #bluecow and @nobleresearchinstitute (on Facebook and Instagram) and @nobleresinst (on Twitter).

FROM OUR FEEDS

We love to hear from colleagues and friends on social media, and we'd love to hear from you. See what people have been saying.

f @nobleresearchinstitute **t @nobleresinst**

f Thank you to Noble Research Institute for hosting over 30 Beefmaster breeders last week! It was a successful event, filled with great discussion and new ideas! **Beefmaster Breeders United, Aug. 21**

t Toured @nobleresinst greenhouse today! Learned about the worldwide application of these environmental experiments. #STEAMpin @Tashman_STEAM, June 20

t Biodiversity = soil health = crops produced = food on your plate. Bottom line land stewardship essential @nobleresinst @OutdoorAmy, June 20

f The environment as cast pictorially speaks volumes of this foundation. **Lawal Abiodun, April 1**



t Great Prescribed Burn Workshop @nobleresinst @KDMeadows91, July 13



f STEM campers donned gloves and lab coats, transforming into scientists to perform a variety of experiments with our friends from Noble Research Institute. **Oklahoma City National Memorial & Museum, July 14**



f Farmhouse **Kaustav Bandyopadhyay, June 24**



t The last of the @nobleresinst community screening of the Medicago Tnt1 mutants. It's been a productive 10 years & some high impact research! **@MedicagoNews, Aug. 16**

IN CASE YOU MISSED IT

A tandem drop of BoarBuster traps captures 45 feral hogs! See the video that's been viewed more than 172,000 times on the Noble Research Institute Facebook page.



FOLLOW #everyNoblestory

See what we're doing in science and agriculture through our experts' eyes on social media. We want to hear your stories, too.

If the Noble Research Institute's stories were raindrops, we'd never have to worry about drought in southern Oklahoma again. Last year, a few employees from across our organization stepped up to help share some of these stories. They are our extended team of citizen communicators. Each year, this group will grow. You can see their perspectives of the Noble Research Institute's work delivering solutions to great agricultural challenges by searching #everyNoblestory on Instagram and Twitter and by following our blogs at www.noble.org.

We invite you to contribute your voice to #everyNoblestory, too. Use the hashtag (and tag us on Facebook or use @nobleresinst on Twitter and @nobleresearchinstitute on Instagram) when posting about your connections with the Noble Research Institute. You can also share your Noble story with us at legacy@noble.org. Who knows? Maybe it'll end up in our next issue of *Legacy*! 🌱

In this issue of *Legacy*, we're highlighting a few of our first experts to share their view of advancing agriculture and land stewardship. Check back in future issues for more #everyNoblestory perspectives. Don't forget, we want to hear your Noble stories! Connect with us on social media or email legacy@noble.org.



📷 @noble_cell_imaging

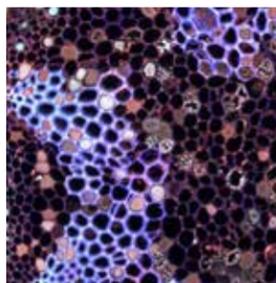
Elison Blancaflor, Ph.D.
Professor

SEEING THE UNSEEN

Elison Blancaflor, Ph.D., leads the plant cell biology laboratory at the Noble Research Institute. Much of his day is spent studying the inner workings of plant cells for a better understanding of plant development. So, a look through his eyes requires a look through the microscope.

PLANTS ARE BEAUTIFUL

Using microscopes as his camera, Blancaflor shares stunning videos and images that reveal the hidden beauty of plants and plant cells. Visit his Instagram channel to learn about basic biological processes and structures as well as how discoveries at such a basic level can translate into benefits for agriculture.



Another image of a cross-section of an adventitious root from a pecan cutting taken with a #confocal #microscope



📷 @dr.abcazenave

Brice Cazenave, Ph.D.
Postdoctoral Fellow

FINDING ANSWERS

Brice Cazenave, Ph.D., is interested in finding out what makes some plants better than others at surviving in low-phosphorus conditions (specifically in alfalfa). And he uses some amazing technology (like drones) to gather data – his clues.



Most of our team was playing with dirt all the day. Came back into childhood. We were tired, sore ... but most importantly: satisfied. #forage365 #medicago #rootresearch #plantbiology #forageimprovement

POSTDOC LIFE

Follow Cazenave's Instagram channel for a behind-the-scenes look at his part in work to develop lines of plants that produce what we need with less fertilizer. In the process, you'll see what daily life looks like for a postdoctoral fellow at the Noble Research Institute.



📷 @kiwigreenthumb

David McSweeney
Biosafety and Greenhouse
Research Manager

KIWI IN THE GREENHOUSE

Step inside the Noble Research Institute's state-of-the-art greenhouse with David McSweeney. You'll often find McSweeney giving a greenhouse tour to a visiting group and, when the visitors are school children, presenting fun-filled lessons about agricultural research and growing plants.

HANDS-ON SCIENCE CLASS

Catch up with McSweeney on his Instagram channel for a glimpse into research done in the greenhouse and the science shared with visiting groups. As a New Zealander living in Oklahoma, McSweeney also shares the things he finds different about living here – like snakes, spiders, skunks and stickers. And that's only the S's.



Is it just me or are these guys singing? #carnivorousplants #noblegreenhouse



🐦 @NobleFunGuys

Mycology
Laboratory

FUNGI ARE COOL

Carolyn Young, Ph.D., started the Noble Research Institute's mycology laboratory in 2006. Lab members study fungi like grass endophytes, which affect plants positively, and the pathogens that cause cotton root rot and pecan scab diseases.



We have DNA! So nice to see it spool! #adayinthelab #fungaldna #everynoblestory

A SCIENTIST'S LIFE

Find out what a day in the life of a scientist looks like by following @NobleFunGuys on Twitter. Hint: It's not all microscopes and lab coats. They might take you to the laboratory, out to the fields, to talk with farmers, or to conferences to share their work.



📷 @austinmiles2010

Austin Miles
Cattle and Technology
Research Associate

REAL-WORLD RANCHING

If you want to see some #cowsof-instagram, check out Austin Miles' channel. Miles assists with research projects pertaining to cattle production on Noble Research Institute farms and ranches. He showcases the livestock, the land and best management practices that promote responsible resource stewardship from the cow to the soil beneath her hooves.

FOR THE LOVE OF BEEF

The work is especially meaningful to Miles because he's a beef producer both at Noble and at home. He manages a cow-calf herd with his wife and family on the farm he grew up on in Whitesboro, Texas. For Miles, it truly is #allforthe loveofbeefcattle.



Fall calving is in full swing at the @nobleresearchinstitute #OswaltRanch ...These girls look like they're about to pop!



🗨️ Stories Behind
the Science

Amy Flanagan
Research Associate

WHY DO SCIENCE?

Amy Flanagan knows that behind every research project there are researchers. And each researcher is a person with interesting life experiences who use their unique expertise to advance agriculture. As a research associate, Flanagan supports researchers by analyzing and uploading data, communicating with collaborators, and working in the greenhouse and laboratory. So, she sees these stories play out every day.



MEET THE HEART

A self-professed biology nerd, Flanagan exposes the heart behind the world-class science happening at the Noble Research Institute. Follow her blog to meet some Noble researchers.

www.noble.org/blog/stories-behind-the-science/



📷 @nobleplantbreeder

Mike Trammell
Senior Plant Breeder

IMPROVING FORAGES

Modern plant breeding includes both DNA-based plant selection and traditional methods that have been used since crops were first domesticated thousands of years ago. Mike Trammell's breeding program, which focuses on perennial forage crops like tall fescue and alfalfa, often involves the latter: selecting plants in the field and crossing them to improve crops for traits of value.

TO THE FIELDS

Trammell's Instagram channel takes you to the fields where research behind breeding better forage crops happens. His group's work ultimately delivers forage crops that livestock producers can use to improve their overall sustainability.



Old world bluestem seed production at Lawton, Oklahoma. This is the variety 'b dahl.'



A Living Legacy

Ten years ago, the Noble Research Institute introduced a new magazine but not without overcoming one obvious problem first.

by J. Adam Calaway, editor

Deciding to launch a magazine was the easy part. Naming it, on the other hand, proved to be a chore.

Content and design for the new publication quickly fell into place. Big photographs. Lots of white space. And personal stories that highlight our programs in an approachable and personal way. Easy-peasy.

However, we played hide-and-seek with a great name for months. The obvious answer was to stick Noble – our founder’s last name and every PR director’s dream adjective – in front of everything: *Noble Times*, *Noble Bulletin*, *Noble Today* or – if we stretched ourselves – *Inside Noble*.

They seemed so ... umm ... expected. The name needed to capture our reader’s attention and convey who we were as an organization. We wanted the unique. We wanted a pop.

But how do you encompass the Noble Research Institute’s activities (fundamental to applied research, plant breeding, consultation, in-field demonstration, education and – at the time – philanthropy) in one name without excluding a particular audience or working group?

You call it *Field Notes*, and the activities from 20-plus laboratories seem overlooked. You call it *Inside the Lab*, and you exclude those who work directly with farmers and ranchers.

The brain-block grew and, ultimately, I

resorted to scribbling potential names on a small whiteboard in my boss’s outer office. He would walk by them, study them for a few seconds and then cross them off. Weeks passed, and I burned through every thesaurus I could find.

When I scribbled *Apex* onto the whiteboard, I knew that feeling under my feet was the bottom of the barrel. What, are we selling climbing gear? Watch out The North Face; here comes Noble.

To be fair, *Legacy* was an early idea that was nixed because of a concern it may not resonate with others the same way it does with us. We have a fundamental belief here at Noble that everything we do, every project and program, is the direct result of the incredible generosity of our founder, Lloyd Noble. We are stewards of his vision and resources. We are a living legacy.

So as we began to revisit the extensive list of possibilities, we kept going back to *Legacy*. The name took root, and soon we could see no other option.

The choice seems so obvious now. We are part of a lineage of excellence, the fortunate curators of a great tradition, and the stories that have filled these pages reflect our ongoing mission to provide solutions to great agricultural challenges.

More so, the stories within *Legacy* have revealed the spirit behind the men and women who propel our great endeavor, and demonstrate how their imagination and ingenuity impacts lives in the South-

ern Great Plains and far beyond.

Seems fitting then, that as *Legacy* celebrates 10 years of chronicling the Noble story, this issue marks our most significant moment – the transformation of the Noble Foundation into the Noble Research Institute.

This is the story of how our organization boldly stepped into a new era, while paving the way for the next generation of Lloyd Nobles to advance agriculture. It’s a great read.

As always, we hope you enjoy this issue of *Apex* (see, terrible name). We hope you enjoy this issue of *Legacy*. 🌱

LET US KNOW WHICH
LEGACY
STORY HAS
BEEN YOUR
FAVORITE.

Connect with us on social media, or send an email to legacy@noble.org

< Legacy launched in the summer of 2007. Ten years later, the fall 2017 issue marks the 25th issue of the magazine dedicated to offering insight into the outstanding scientists and agricultural consultants who pursue the vision of Lloyd Noble, founder of the Noble Research Institute.

This photo illustration, which features Chance Tynes, a ranch research assistant, and his horse, Scotty, symbolizes the Noble Research Institute stepping into a brand new era of advancing agriculture and land stewardship through research, education, demonstration, and direct ties with farmers and ranchers.

A BRAND NEW ERA

Lloyd Noble didn't hesitate when he sought a solution to revitalize agriculture in southern Oklahoma following the Dust Bowl. Seven decades later, his legacy continues with another bold step for his organization.

by Courtney Leeper

Four hundred sets of eyes focused on Steve Rhines in anticipation of further explanation.

The dawning of a new era in an organization's history is a momentous occasion, and, at this particular occasion, the 400 employees were devouring every detail. This highly anticipated all employee meeting, held April 26, 2017, promised to reveal a plan they knew had been months in the making.

Minutes earlier, Bill Buckner, president and CEO, and Rusty Noble, a grandson of the organization's founder, Lloyd Noble, had announced to employees that the Noble Foundation would become the Noble Research Institute in five days.

The Noble Research Institute would be an agricultural research organization. Not in just the descriptive sense of the phrase, as had been true for the past seven decades. But in the legal sense. A new classification of nonprofit, an "agricultural research organization" or ARO for short, had been created by Congress in 2015, and Noble was pursuing the designation.

The first step – which would be taken on May 1, 2017 – was to split the original Noble Foundation into two entities: one for research and education, one for philanthropy.

For Rhines, this moment was important. The vice president and general counsel took the stage and invited his fellow employees into his world of tax code and legal technicalities, into the land of tax-exempt rules that shape what these plant scientists and agricultural consultants can do and how they can do it. As part of a private foundation – the organization's current, tax-exempt status – its research and educational operations were operating as square pegs in a round hole. The transition would round out the pegs.

In short, all of the Noble Foundation's operations – education, producer relations, research and demonstration – would continue. At the same time, this

pursuit to become an ARO ushered in a brand new era for the organization and agriculture.

By the end of his presentation, Rhines jokingly told the audience they each now had a "minor in tax code."

More laughter rippled through the crowd as he summed up the logistical part of the transition: "On Monday, we'll all come to work as Noble Foundation employees. At about 10 a.m., we will all simply become Noble Research Institute employees."

These researchers were about to be given new tools for moving their science, knowledge, and innovative ideas into the hands of farmers, ranchers, and other land managers. Creating the new tools for these tool-builders of agriculture was a 25-year-long organizational marathon – one that Rhines became a part of upon his arrival in 2001 – that wasn't quite finished.

A DIFFERENT BREED

Those curious about anything ARO-related will find their answers in the bottom drawer of Rhines' office credenza.

This drawer represents an intense journey that spans eight-plus years of Rhines' career and holds historical files that date back to the early 1990s, the genesis of the idea. It includes letters and documents all neatly arranged in manila folders and expandable files.

When Rhines came to the Noble Foundation in 2001 to serve as intellectual property counsel, he became part of a project that had started in 1992 with a simple question: How do we best steward the resources provided by Lloyd Noble when he established this organization so they can benefit agricul-

WHAT IS AN ARO?

Agricultural research organizations are a type of 501(c)(3) public charity. An ARO is required to:

1. Directly engage in the continuous active conduct of agricultural research.
2. Conduct research in conjunction with a land-grant college or university or a non-land-grant college of agriculture.
3. Either devote a substantial part of its assets to or expend a significant percentage of its endowment (3.5 percent or more of the fair market value of its endowment) or both for the continuous active conduct of such agricultural research.

For more information

Official Announcement: bit.ly/noble-next

Frequently Asked Questions: www.noble.org/faq

Announcement Videos: www.noble.org/blog/when-one-becomes-two

Steve Rhines, vice president, general counsel and director of public affairs for the Noble Research Institute, led the effort to create agricultural research organizations (AROs) as a new venue > for funding agricultural research.



... [THE] PURSUIT TO BECOME AN ARO USHERED IN A BRAND NEW ERA FOR THE ORGANIZATION AND AGRICULTURE.

tural producers and consumers in this generation and those to come?

The Internal Revenue Code, or Code, defines two types of 501(c)(3) nonprofits: public charities and private foundations. Since its inception, the Noble Foundation had been regarded as a private foundation; however, the scale of its operations made it a unique one.

Like most private foundations, the Noble Foundation was initially funded by one private source (Lloyd Noble) and most of its revenue came from the investment of those funds. Most private foundations provide grants to other charitable organizations that conduct research, provide services or administer other operations to directly benefit people; the Noble Foundation provided such grants.

Unlike most private foundations, the Noble Foundation also conducted its own direct operations: basic and translational plant science, applied

agricultural research and demonstration on working farms and ranches, no-cost consultation for farmers and ranchers, and educational programs for youth and adults.

In many ways, the Noble Foundation's research and education operations were akin to the operations found in universities and peer research institutes, all of which are public charities.

But the Noble Foundation was not a public charity per the definitions found within the Code. As a private foundation, the Noble Foundation was at a disadvantage in regards to how it funded its research from third-party donors, how it could partner with others to develop technology and innovations, and its options for moving technology and innovation from its fields and laboratories into the hands of farmers and ranchers, who are striving to feed a growing world population and conserve natural resources.

While the benefits of being a public charity over a private foundation are commonly appreciated, the Noble Foundation had no viable way to become one. The Noble Foundation didn't fit any of the specific public charity molds. It wasn't a church or a hospital or an educational institution. And its revenue came primarily from one source: a family's endowment, as opposed to a broad base of public support, including governmental research grants and private donors. Further, with there being a finite amount of such public support for nonprofit agricultural research – particularly for research that does not directly influence or affect commodity crops – the Noble Foundation did not have many options.

In 2004, Rhines and others from the Noble Foundation met with counsel in Washington, D.C., to discover whether an obvious alternative had been overlooked in its quest to become a public charity. In these conversations, attorneys from the firm of Hogan & Hartson (today, Hogan Lovells) saw parallels between the Noble Foundation's structure and operations and another type of tax-exempt organization: medical research organizations (MROs). The distinction, of course, was that these organizations are dedicated to the conduct of human medical research, which did not extend to matters of soil, plants, water or animals.

Hogan's connection to medical research organizations was not obvious but significant. The firm had worked with representatives of Howard Hughes in the 1950s to modify the Code to define and create MROs as a recognized type of 501(c)(3). The Howard Hughes Medical Institute ultimately became the first MRO in the U.S.

Having a clear understanding of the challenges, the firm said finding public charity status through MROs or an MRO-like model would be difficult for the Noble Foundation. They offered the sobering counsel that at a minimum the definition of "medical research" would need to be modified to encompass agricultural research or, more preferably, a new "agricultural research organization" would need to be created within the Code. Their consensus was that potential

NOBLE RESEARCH INSTITUTE MISSION, VISION AND CORE VALUES

MISSION STATEMENT

To deliver solutions to great agricultural challenges.

VISION STATEMENT

To be the preeminent agricultural research institute, a trusted source of transformational knowledge and products, education and technology to advance agriculture and land stewardship.

CORE VALUES

Begin with humility. Put others first. Shift your focus to those around you, and help them find success.

Build together. Success is a result of collaboration not standing alone. Look for new ways to unify efforts. Listen. Mentor. Seek to help those around you improve, and always recognize their accomplishments.

Never fear challenges. Be bold. Think beyond the status quo. Do not let the threat of failure or the perceived size of the challenge deter us from our goal. Seek to discover, dare to attempt something new, and look toward tomorrow with optimism.

Lead with passion. Advance the mission daily through your unquenchable desire for excellence. Serve as an example for others.

Put words into action. Knowledge for the sake of knowledge is not enough. Work to move ideas into solutions. Invent. Solve. Take action, and deliver even more than is expected.

Be responsible for tomorrow. Keep your commitments. Work harder than the day before. Create and maintain a safe work environment. Know that today's decisions affect tomorrow's outcomes.

Be noble. Be honest. Communicate. Appreciate others' contribution. Strive for excellence in every task. Take the opportunity to be exceptional. Treat others the way you want to be treated. Better mankind.



As a private foundation, the Noble Foundation was unique because of its emphasis on the direct conduct of research and consultation activities. As a public charity, the Noble Research Institute will continue these direct operations in a more relevant form with the IRS.

CONTINUED ON P. 26

Bill Buckner, president and CEO of the Noble Research Institute, announces the new era during a special event in Oklahoma City on May 5, 2017.

**NOBLE
RESEARCH
INSTITUTE**
Advancing Agriculture



**NOBLE
RESEARCH
INSTITUTE**

Science in Agriculture



AREAS OF ACTIVITY

The Noble Research Institute continues existing activities in four interconnected areas:



RESEARCH

Answering basic, translational and applied questions relevant to agriculture.



PRODUCER RELATIONS

Connecting with farmers and ranchers through consultation and training.



APPLIED AGRICULTURAL SYSTEMS AND STEWARDSHIP

Operating almost 14,000 acres of farm and ranch land for research and demonstration.



EDUCATION

Engaging students – youth to adult – in learning about science and agriculture.

CONTINUED FROM P. 23

for modifying the Code to create a new type of 501(c)(3) was ill-timed and not likely achievable.

Much like times before, the Noble Foundation's options to become a public charity appeared unachievable if the foundation continued its agricultural research and educational programs in furtherance of its organizational mission. Importantly, however, the Board of Directors, which is largely composed of Lloyd Noble's descendants, was not willing to compromise the organization's activities, impact and purpose merely to achieve a particular tax-exempt form.

The written form of Hogan's guidance was filed away with similar opinions and other concepts that had accumulated from external counsel over the years of exploration.

There, the documents sat for three years. But the MRO seed had been planted.

A BOLD STEP

In 2008, the discussion of potential tax-exempt options surfaced once again. Rhines dug into his file drawer and reviewed the many routes that had been considered, including the Hogan comments. The MRO concept – even with its obstacles – resonated the loudest.

MROs were a proven model for philanthropists, offering an additional avenue to give. Beyond donating to existing organizations or establishing private foundations to make grants to others, MROs allowed philanthropists to directly fund and conduct medical research.

MROs are a unique form of public charity in that their primary source of revenue is from a single source, similar to a private foundation like the Noble Foundation. To satisfy their obligation to serve the public (and to maintain their tax-exempt status), Congress required that MROs 1) engage in the continuous conduct of medical research, 2) conduct research in conjunction with at least one nonprofit or government hospital, and 3) spend at least 3.5 percent of the fair market value of their endowment in conducting such research.

There are more than 200 MROs operating in the U.S. today. Many of these organizations have storied histories and visionary founders that, similar to Lloyd Noble, had a desire to better human health through the conduct of research; philanthropists like Paul Allen, the late Jim Stowers, and the Van Andel family.

The second review of the MRO concept reaffirmed that an MRO model did not specifically offer the Noble Foundation an avenue to becoming a public charity, but it did offer a usable model. An idea was born, one that could establish independent research institutions with the focus of conducting research on areas (i.e., water, soil, plants and animals) that directly influence food safety and supply, fiber production, the environment, and society.

Rhines drafted the initial legislative language that would create agricultural research organizations, or AROs, and internal discussions and vetting began.

By June 2008, Michael Cawley, Noble Foundation president at the time, along with Rhines and Jeff Moen, who joined the organization in 2007, developed a proposal and presentation for the Board to consider pursuing the idea of AROs.

If AROs became a reality, it would be a perfect fit for the Noble Foundation. No longer would the organization not quite fit as a private foundation and not quite fit as a then-known public charity.

Even greater, the concept could help solve a much larger issue facing the agriculture sector: lack of funds available for research. Creating AROs would open new opportunities for more people to dedicate their wealth to agricultural research. (See the next story about the potential impact of AROs on agricultural research).

It would be a bold step. There were many unknowns. They just needed one last, crucial answer and the Board provided it: "Yes."

Rhines and Moen spent the equivalent of several months on the road over the next eight years traveling the country, explaining the concept, receiving input to improve the legislative proposal, and educating other agricultural organizations. They visited with deans of agricultural colleges, industry leaders, and, ultimately,

lawmakers and their staffs.

The project was forecast to require two years, but the project timetable was influenced by changing administrations, ever-present discussions of tax reform and evolving political environments.

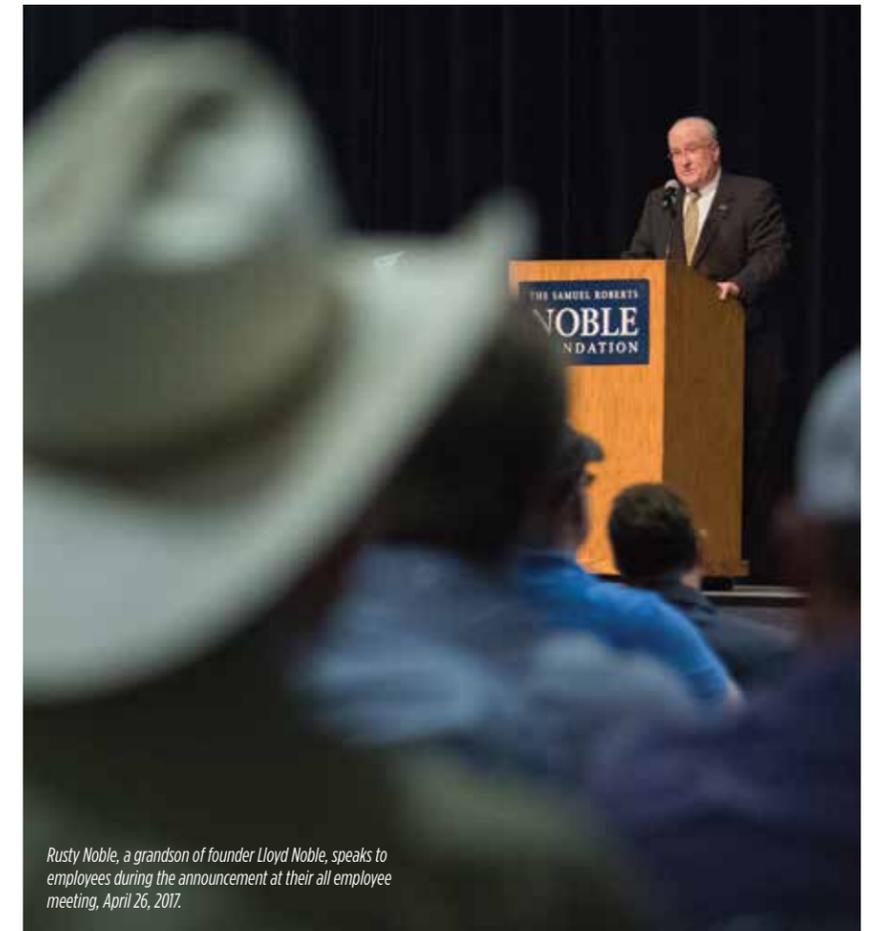
With the assistance of legislative advisers in Washington, D.C., Rhines and Moen connected with House and Senate offices that understood agriculture and the impact research has on both the present and the future. They understood the challenges of continuing to fund agricultural research primarily from appropriated public dollars, and they too sought a greater complementary role from private philanthropy to advance agriculture.

The legislation was championed and led by a geographically diverse group of legislators from California (Chairman Devin Nunes), Wisconsin (Rep. Ron Kind), South Dakota (Sen. John Thune) and Michigan (Chairwoman Debbie Stabenow). Closer to home, many of Oklahoma's legislative representatives, including Sen. Jim Inhofe, Rep. Tom Cole and Rep. Frank Lucas, provided key insight and guidance throughout the legislative effort.

By 2015, there were 65 associations, universities and other nonprofits lending their support to what had become known as the Charitable Agricultural Research Act, which had bipartisan support in both the U.S. House of Representatives and U.S. Senate. The bill was introduced eight times from 2011 to 2015 before it was signed into law by former President Barack Obama on Dec. 18, 2015, as part of the Protecting Americans from Tax Hikes Act of 2015.

"There were many times when it seemed this wasn't going to work, when our plans would get derailed by a multitude of things that had nothing to do with the merits of the legislation," said Rhines more than a year after the Act passed, "but we kept going back to something one of the Board members, Bill Goddard, said in one of our early meetings: 'AROs extend the legacy of Lloyd Noble; this effort serves a greater purpose.' Being a part of something like that doesn't happen every day or even in every career."

The Board closely followed the prog-



Rusty Noble, a grandson of founder Lloyd Noble, speaks to employees during the announcement at their all-employee meeting, April 26, 2017.

ress of the legislation, so there was no surprise to them when it was signed into law. After 70 years of operating the organization as a private foundation, though, there was still much to discuss and consider before deciding to transition the Noble Foundation into an ARO.

One of these considerations was the Noble Foundation's grant-making program.

CONTINUING THE LEGACY

The Noble Foundation made its first grant – \$14,000 for an electron microscope – to the University of Oklahoma in 1946. By April 2017, the organization had provided more than \$328 million in schol-

arships and grants to other nonprofits. These nonprofits included local arts and youth programs, hospitals and medical research institutes, and other community-supporting organizations, primarily in Oklahoma.

The ARO model was an ideal match for the Noble Foundation's direct operations because: 1) AROs must continuously and directly conduct agricultural research. About one in four Noble employee has a Ph.D., and nearly every employee is either directly involved in research or supports those who are. 2) AROs must conduct research with at least one land-grant university or non-land-grant college of agriculture. The Noble Foundation has worked with qualifying universities or colleges since at least 1950, and today Noble researchers and consultants work in conjunction with more than 10



Jessie Nance, a great-granddaughter of founder Lloyd Noble, helped Bill Buckner, president and CEO, reveal the Noble Research Institute's new logo during the Ardmore community announcement, May 5, 2017.

qualifying universities or colleges with additional collaborations pending. 3) An ARO must spend more than 3.5 percent of the fair market value of its endowment for research. The Noble Foundation has often exceeded 5 percent (the amount required of a private foundation) of the fair market value of its endowment for its operations.

But the Noble Foundation's grant-making program, as it existed, could not function within the ARO requirements. The Board members discussed this dilemma at great length. They didn't want to end their giving and its impact on charitable organizations and communities.

So, they decided to separate the activities of the Noble Foundation. The research, education, consultation and on-farm activities would carry forth in the existing entity, which would transition from a private foundation to an ARO. The philanthropic activities, including the grant-making and scholarship programs, would continue in a new private foundation.

This left the new organization to be named.

The Board decided the new private foundation should use the original name: The Samuel Roberts Noble Foundation. They felt this best reflected the original legacy attached to the name, which was chosen by Lloyd Noble to honor his father, Samuel Roberts Noble, as the most charitable man he knew.

The original organization, which would become an ARO, would receive a new name: the Noble Research Institute, LLC. The new Noble Foundation would act as the Noble Research Institute's parent, meaning the same governing board that made these decisions would continue to govern the organization through the Noble Foundation.

In December 2016, the Board members took a final vote. It was unanimous. The plan would move forward.

For Rhines and Moen, who had started this journey so many years before, it was an endpoint and a beginning. They had served to move an unlikely concept into reality, which could conceivably benefit all of agriculture. More personally, however, they had helped build an opportunity that had immediate and tangible impact on the Noble Foundation and its

long-standing operations.

The satisfaction of completing the milestone, however, was temporary. With this historic vote, much work lay ahead. The plan was to separate the organization on May 1, a mere four months away.

NEW TOOLS FOR AGRICULTURE

The most important aspect of the action plan was to bring the employees into it.

It was no secret that the Noble Foundation was involved in creating the ARO designation. However, details affecting the organization weren't discussed until after the Board had made its final decision. It was important to the Board, however, that the employees be brought up to speed before the papers were filed and the public aspects of the process officially began.

Will Moseley, a wildlife and fisheries consultant, describes the weeks leading up to the announcement as filled with wonderings about what was to come.

By this time, employees had known for months that the Board had officially decided to pursue turning the Noble Foundation into an ARO.

"We knew it was coming, but we didn't know how or what it would look like," Moseley said. "When the announcement was made, I thought the direction made sense. I was impressed with how well thought out everything was, and I was excited about how the organization was going to be able to move forward."

President Bill Buckner and other members of the leadership team, including Rhines, spent the three-hour meeting outlining the transition. Excitement began to build, especially when the microphones were turned off and the meeting room turned into a party room. Long lines formed at food stations and tables, where everyone could pick up a bag filled with goodies, including a T-shirt featuring the new Noble Research Institute logo.

The next step was for Rhines to submit the paperwork to effect the final name changes and to notify the IRS of the organization's decision to transition from a private foundation to a public charity for the Noble Research Institute. That was May 1, 2017.

Then, the announcement was ready to go public.

On May 10, familiar faces from the Ardmore community trickled into the Ardmore Convention Center, where they learned the news. This time, Jessie Nance, a Board member and great-granddaughter of Lloyd Noble, joined Buckner on stage to reveal the Noble Research Institute's new logo.

Gary Simmons, who retired from the Noble Foundation in 1988 as the Agricultural Division director, held up his cellphone to take photos of Buckner's presentation of the Noble Research Institute's new mission statement: "To deliver solutions to great agricultural challenges."

"Having been part of and accustomed to The Samuel Roberts Noble Foundation name for some 62-plus years, I wondered why the change," Simmons said. "However, I see that the change should open up more opportunities to increase the various services of the Noble Research Institute. The forward thinkers within the organization who suggested and investigated the advantages of the change are

to be commended."

He added: "Plus, coffee tastes the same in the Noble Research Institute cup as it did in the Noble Foundation cup."

After inviting the community to take home Noble Research Institute gift bags, the Noble crew packed up and headed to Oklahoma City for the state announcement, where Lt. Gov. Todd Lamb joined in the celebration.

Over the next several days, as everyone learned to say "Noble Research Institute" rather than "Noble Foundation," the flurry of activity continued. Websites needed updating. Everything from letterhead to light pole banners needed the new logo. The transition was taking shape.

But for the general activities, business continued as usual. Or, as Nikki Charlton, Ph.D., a senior research associate in the mycology laboratory, said, "It's research as usual."

Moseley echoed the thought. "There wasn't a lot of change to the activities that support our purpose and the mission of the organization. We're still helping farmers and ranchers like we've always done. We just have a few new opportunities now," he said. "This opens a lot of doors to fill niches in agriculture that aren't being filled right now. And while we won't go jumping into those immediately, it's exciting that the possibilities are on the horizon."

For Rhines, the marathon isn't quite over. He anticipates months to go by before receiving notification from the IRS that they officially recognize the Noble Research Institute as a public charity, more specifically as an ARO. Then, a standard 60-month process will begin to terminate the organization's status as a private foundation. During this time frame, the Noble Research Institute will begin to report its ongoing activities that support the agricultural research organization.

And when the Noble Research Institute does officially become an ARO, it will be far from an end. A new lap in the marathon of continuing Lloyd Noble's legacy will have begun.

"The product of this effort will give our organization a great set of new tools," Rhines said. "I'm excited to see how these come together to add to our history of benefiting agriculture." 🌱

THE SAMUEL ROBERTS
NOBLE
FOUNDATION

THE NEW NOBLE FOUNDATION

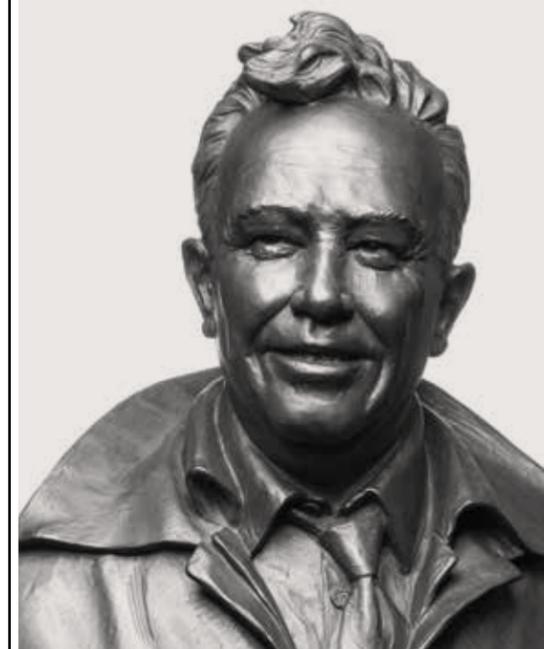
Moving forward, the new Noble Foundation will function as it previously had worked. Grant requests will be submitted, processed and reviewed by the Noble Foundation's Board of Directors as they always have.

MISSION STATEMENT

To continue the philanthropic legacy of Lloyd Noble by funding agricultural research and making charitable grants that cultivate good health, support education and build stronger communities.

VISION STATEMENT

To see our grant recipients successfully address agricultural challenges, expand educational opportunities, advance medical research, improve health services and strengthen our communities.



FROM THE ARO ARCHITECTS

They needed an act of Congress to create a new avenue for funding agricultural research. Here's their perspective on making it happen.

by Steve Rhines, vice president, general counsel and director of public affairs and Jeff Moen, director of strategic alliances

Armed with some distant civics knowledge, a functional understanding of how legislation becomes a law, and a favorable memory of Saturday morning's "I'm Just a Bill" from School House Rock, we embarked on an endeavor to modify the Internal Revenue Code.

With the approval of the Noble Foundation Board of Directors in 2008, we set out to create a new type of 501(c)(3), an agricultural research organization. Our goal was to build public agricultural research capacity in the United States without commensurate federal spending. Undeniably, the effort was a nontraditional route to benefit public agricultural research – as well as all consumers of food and fiber – through the development of a new nonprofit vehicle to infuse greater private philanthropy into public agricultural research.

However, our concept wasn't completely novel. We were following a proven model of medical research organizations that had been created in the U.S. Internal Revenue Code in the mid-1950s. We knew there was a place for independent research institutes; we had the benefit of working daily at The Samuel Roberts Noble Foundation, predecessor to today's Noble Research Institute.

We also knew what many entrepreneurial philanthropists had done by giving their wealth to private foundations or medical research organizations to solve great problems in the (non-agriculture) life sciences. Thus, it seemed appropriate to create agricultural research organizations so that like-minded philanthropists could do more to advance agriculture.

Perhaps it would have made for a great story if everyone had rapidly seen the merits of the legislation; if there had been no detractors, no distractions and we'd achieved quick passage into law. Such was not the case.

We started the project on the eve of the administration change following the 2008 presidential election. Our grand idea soon became mired in greater national discussions regarding bank bailouts, automotive industry bailouts, health-care debates and adoption, a farm bill, and discussions of comprehensive tax reform. However, despite the noise, many listened to the purpose of our effort. Slowly at first, but over time, more than 65 universities, associations and organizations came to support the effort and the role agricultural research organizations could play in the agricultural research landscape.

There were ups and downs. We lost count of how many times we declared to one another that the next meeting was the "most important meeting to achieving introduction." Once the legislation was introduced as House and Senate bills, we rarely allowed ourselves the indulgence of believing

the next meeting could result in passage of the bill into law.

However, during the seven years it took to attain passage, we consistently met engaging and helpful people with a strong interest in furthering agricultural research. At the top of the list were many legislators and staffs, from both rural and urban settings, that had a keen sense of future need and an understanding that public dollars alone cannot be the solution to the nation's agricultural research needs.

In 2015, the president signed into law the Protecting Americans from Tax Hikes Act of 2015. Deep within the pages of that legislation, specifically Section 331, was the language that created agricultural research organizations. On the evening that Congress passed the Act, after checking and rechecking that Section 331 had remained, there was a moment when we had a chance to consider the journey from concept to inclusion in the United States' Internal Revenue Code. Throughout the process, we learned firsthand that many good ideas that start in the halls of Congress do not make their way out in the form of agreed-upon legislation. It was a night to be grateful.

Having time to reflect, our gratitude is not limited to merely a body of lawmakers that voted "yes" that December night. We are appreciative of a Board of Directors that had the vision to undertake the project and the patience to see it through. Our legislative advisers were essential in navigating the legislative process for the 112th, 113th and 114th Congresses. The Association of Public and Land-grant Universities provided guidance, and many agricultural deans and vice presidents provided insight in the early days of refining the proposed language that ultimately became the final law. We're also thankful for the legislative sponsors and co-sponsors who led the way for the legislation to progress to law.

We recognize that passage of the legislation was only the first step; broad implementation and use of agricultural research organizations is necessary to fulfill the ultimate goal. However, we are steadfast in our belief that agricultural research organizations have the potential to dramatically impact agricultural research and its outcomes for generations to come.

For us, the project was one-of-a-kind, once-in-a-career, and we are honored to have contributed to the legacy of Lloyd Noble. 🌾



FOR US, THIS PROJECT WAS
**ONE-OF-A-KIND, ONCE-IN-A-CAREER,
AND WE ARE HONORED**
TO HAVE CONTRIBUTED TO THE LEGACY OF LLOYD NOBLE.

THE 40-YEAR- LONG LOOK

The longest-tenured agricultural consultant revisits the organization's past and progression.

by Dan Childs, senior agricultural economist

When I started working at the Noble Foundation in 1978, I became the 73rd employee.

Within a short time, I knew the name of every co-worker, the name of their spouse and how many children they had. We operated as two divisions (Biomedical and Agricultural). There was a soils laboratory where soil was analyzed, mostly for the farmers and ranchers we worked with. There was also a print shop that performed most of our printing needs.

The organization owned three farms: Headquarters, Pasture and Demonstration Farm, and the Red River Demonstration and Research Farm. The farms used horses to aid in cattle handling. There were no four-wheelers or side-by-sides, though we did purchase a few three-wheelers for farm use in the early 1980s. No irrigation existed on any of the farms except for a small drip-irrigated pecan and peach orchard located on the Red River Farm. Many types of forages were used to grow various classes of cattle. However, the farms were mostly used to grow consultants. Each farm was managed by one of the three consultation teams, which provided great opportunities for consultants to gain experience and knowledge. All consultation plans and letters were handwritten by consultants then typed on paper with carbon copies so a copy would be available for the file.

In the early 1980s, we received a hard copy memo from Bud Patterson, Ph.D., who directed the Biomedical Division. They had recently purchased a fax machine, and anyone was welcome to use it. We wondered why we would ever need a fax machine. In the 1980s, we also received monitors and keyboards that were connected to an IBM computer in downtown Ardmore. We were excited to have access to a word processor where you could backspace to correct a mistake and not have to use Liquid Paper.

The 1980s was a tough decade for production agriculture. The decade started off with one of the driest years on record with 66 days in a row of triple-digit temperatures during June, July and August. The cost of credit changed from being very low to very high. I spent many days with farmers and ranchers in bankruptcy court trying to convince the judge and creditors to agree to work out plans. It was a decade that greatly matured me and many of my fellow consultants.

The '80s eventually gave way to the '90s and the beginning of the Noble Foundation's commitment to

CONTINUED ON P. 40



WHERE I CAME IN

The new guy reflects on a historic change made after only three days on the job.

by Tim Woodruff, web designer

When you think of the field of agriculture, you probably don't immediately think of web design. Neither did I. As a designer from Georgia, I had no idea my skill set could promote the big picture of solving great agricultural challenges.

It all started with a simple online job listing, which led to a phone interview with the communications managers at what was then called the Noble Foundation. Just a few days later, I was on a plane headed to Ardmore, Oklahoma, by way of Dallas-Fort Worth International Airport.

From the moment my plane landed, I noticed the friendly professionalism that we refer to here as the Noble Experience. The entire process impressed me greatly: from the driver who took me to Ardmore and bought my dinner to the resident manager who showed me to my hotel room at Noble's Conference Center to the interview the next day where I met so many great people.

I had prayed God would show me if this was the right place to work. In return, I had the most comfortable interview experience of my life. I went home eagerly wanting to work at Noble, and I'm thankful they chose me.

The first day was exciting. I was able to meet so many kind people. The friendliness I first experienced in my interview proved to be genuine and real. Getting to work with great people who perform their craft well is one of the best experiences in the world.

As I went through orientation the first two days, I realized the communications team was preparing for something big. Phrases were mentioned that caught my ear. Announcement. ARO. Name change. I could tell something exciting was about to happen.

The mystery and excitement was unraveled at the all employee meeting on my third day of work: the Noble Foundation was about to become the Noble Research Institute.

I, as a brand-new employee, experienced the history of this moment in a way that few others have. I watched as our president paid tribute to the Noble Foundation's rich legacy and spoke of the changes in the future. As the Leadership Team explained what this transition would mean for us, I saw the employees enthusiastically rally behind them in support of this new endeavor. Being an agricultural research organization (ARO) will mean we can more effectively accomplish the goal set by Lloyd Noble over 70 years ago: to better mankind.

While I don't have much experience with where Noble has been, I've been thoroughly impressed with what we have accomplished, and I'm excited to see where we will go. 🌱

FUNDING THE ANSWERS TO FARMERS' QUESTIONS

Cattle graze switchgrass at the Noble Research Institute's Red River Farm. The farm is one of seven operated to research and demonstrate practices that promote responsible resource stewardship.

U.S. farmers produce the world's most abundant food supply, thanks, in part, to technological advancements. But with shrinking public funds available for agricultural research, new solutions are needed for funding continued innovation. Society depends on it.

by Laura Beil



Most Americans have never heard of Norman Borlaug, which is surprising given that he is credited with saving the lives of about 1 billion people.

As a plant scientist during the mid-20th century, the one-time Iowa farm boy was instrumental in developing a high-yield, short-stalk wheat that could be grown in various environments around the world.

Upon his death in 2009 at the age of 95, *The New York Times* said the crop varieties he produced “helped to avert mass famines that were widely predicted in the 1960s, altering the course of history.” His work earned him a Nobel Peace Prize and a Presidential Medal of Freedom.

And yet, Norman Borlaug’s name is rarely mentioned in history classes, if it is at all. Outside the world of agriculture, he’s pretty much unknown. One magazine called him “The Forgotten Benefactor of Humanity.” Another rated him #1 on a list called “6 People You’ve Never Heard of Who Probably Saved Your Life.”

Had he given humanity a new drug or vaccine, he would probably be remembered with great renown. But while

society intuitively knows the benefits of medical research, the general public is largely detached from the faceless discoveries that preserve soil or cure diseases that threaten our food. And this lack of drama and visibility affects not only public interest but funding.

The past two decades have seen an erosion in public investment for agricultural research, causing many to worry that future farmers and ranchers may struggle to keep pace in a world that must support more people on less land.

“Outside of agriculture, not many people recognize the need for agricultural research. It’s not the kind of thing that evokes an emotional response in most givers,” says Steve Rhines, vice president and general counsel for the Noble Research Institute. “Agriculture has struggled with how to convey the ‘research is important and necessary’ story. Without an accessible story, we are challenged

when seeking support from those outside of agriculture, including policymakers and consumers.”

The United States was once the top contributor of public funds for national research into food and agriculture. (“Public funds” take the form of government grants, allocations or direct appropriations.) But since 2009, the top spot has gone to China. U.S. contributions are also lower than the total for the developed nations of Western Europe and the Asia Pacific region.

In total, federal and state agencies spent about \$3.8 billion on agricultural research and development in 2013 – a number that has been dropping since the beginning of the 2000s. And while almost \$4 billion sounds like a lot, consider that the Department of Defense was allocated \$71 billion in research in 2016. Federal spending on medical research topped \$31 billion.



Research associates and greenhouse staff repot switchgrass plants grown for research studies to help discover the genetic mechanisms for increasing forage biomass.

Ranchers learn the latest research-based information during the Noble Research Institute’s fall grazing workshop, Sept. 13, 2016, held at the Dixon Water Foundation in Decatur, Texas.



ASK THE EXPERT:

RICK NELSON, Ph.D.

Rick Nelson, Ph.D., became one of the first plant scientists at the Noble Research Institute when he joined in 1988. He will be retiring later this year, in December, after contributing more than three decades of service to plant science studying plant biology and virology.



Rick Nelson, Ph.D., studies plant biology and virology.

Q: WHY DO WE NEED AGRICULTURAL RESEARCH?

A. In agricultural research, we often talk about improving crop yields. This is certainly important. Without research, which includes plant observation, selection and mating, we would be eating fruit or vegetables from unimproved, essentially wild, species. The yields from these plants would be so dramatically reduced compared to what we enjoy today that we would never be able to sustain the existing world population.

Currently, other topics affecting agriculture have risen in importance to society. For example, we are concerned about overusing the limited amount of minable plant nutrients (like phosphorus) available on Earth and are renewing efforts to benefit the environment by controlling excess nitrogen fertilizer runoff into watersheds. These nutrients are essential for plant growth, so we have to figure out ways to more efficiently source and use them. We cannot address these issues by maintaining the status quo or going back to older varieties. Often, high-level breakthroughs come from research.

To aid in this work, my laboratory has cloned and modified a plant virus so it can be used to identify genes that may be used to improve plants' abilities to more efficiently use nutrients. This modified plant virus, a product of basic research, is also used throughout the world to identify genes or groups of genes that can enhance sugar release from plants for use as specialty product or fuel sources or to improve a plant's ability to resist disease. As is always the case, research can be adapted to address any need, and it is very often through research that meaningful advances, such as improving a plant's nutrient use, are made in agriculture.



For more information

Learn more about Rick Nelson's work at www.noble.org/staff/research/rick-nelson

At the same time federal funds have contracted, so has public support of colleges and universities among state legislatures, says Paul Heisey, Ph.D., an agricultural economist at the U.S. Department of Agriculture. Public universities in the heartland – many of which are traditional powerhouses for ag research – have been hit especially hard. Without large endowments to buffer their bottom lines, many land-grant universities have closed positions, reduced (or eliminated) departments and slashed their own research budgets.

What has declining public funds meant for science? As agricultural research spending has fallen, so has the proportion of research publications by American scientists in scientific journals, according to an analysis from the Economic Research Service conducted for the Organization for Economic Cooperation and Development. In 1996, more than one-third of all scientific citations for agricultural research were credited to U.S. scientists. By 2012, that number had fallen to 18 percent, as scientific output from the rest of the world rose.

Meanwhile, private industry is spending more than ever on agricultural research, at just more than \$12 billion in 2013, the latest year with complete figures available. But private spending doesn't necessarily offset a lack of government support.

While important discoveries come from commercial sources, "industry has different priorities," Heisey says. For example, roughly half of private funds are spent looking for improvements in the manufacturing of food and feed. The two biggest categories for public sector funding fall under the heading of plant systems/crop protection and environment/natural resources, the latter of which has little to no industry investment at all. Industry research in crop science is tightly focused, Rhines says, concentrating mostly on just five row crops, including corn and soybeans.

Industry's involvement in the research field also stands to further exacerbate the public disconnect for the need for publicly funded agricultural research, says Kent Schescke, executive vice president of the nonprofit Council for Agricultural Science and Technology. "It creates this perception that agriculture is run by big companies when in reality it is still very much a farmer-owned industry," he says. As of the 2012 Census of Agriculture, which offers



Noble Research Institute researchers gather wheat and rye samples for root architecture studies led by Elison Blancaflor, Ph.D. (far right). They will examine roots from plants grown in both tilled and no-till conditions.

the most recent data, 97 percent of the 2.1 million farms in the U.S. are family-owned. The 3 percent that are nonfamily farms include those like the research and demonstration operations of the Noble Research Institute, a nonprofit research institution.

Since U.S. food is not in short supply, some scientific advancements even suffer backlash as they are seen as solely benefiting producers or the corporations that supply inputs. "People take it for granted that food is going to be there, and many consumers do not view innovation and technology as a good thing when it comes to their food," said Schescke.

To help lawmakers better connect with agricultural science, the National Coalition for Food and Agriculture Research formed more than two decades ago. The group hosts luncheons that try to connect congressional staff members with what happens in research laboratories across the country and how research benefits

consumers in easily recognizable ways. While the group has made some progress, "There are very real challenges," says executive director Tom Van Arsdall. "It's important, but how do you make funding for ag research and education competitive with other interests? I wish we had the answer."

One hope is that newly established agricultural research organizations, or AROs, may help make up for support that has been lost elsewhere, Rhines said. Medical research organizations, typically established with private philanthropic funds, have existed for decades to help subsidize nonprofit health research using private wealth. One of them, the Howard Hughes Medical Institute, was founded in the 1950s and carries an endowment of \$18 billion. Some are newer, such as the Stowers Institute for Medical Research in Kansas City, which opened in 2000. Those and others started because their founders had a passion for research.

With the creation of agricultural research organizations, a new type of 501(c)(3), Rhines hopes philanthropists will see the same need to support agricultural research as they do for medical causes.

For example: Shoppers go home from the grocery store every day with orange juice, unaware that citrus greening is consuming groves in Florida. The bacterial infection, spread by insects, has cost growers almost \$5 billion over the past decade. University researchers are working to try to stop it.

"This is a disease that has a significant impact on a very strong industry in this country," Rhines said. "Envision the establishment of a nonprofit research entity – an agricultural research organization – dedicated to the eradication of citrus greening. AROs represent a new opportunity for focus and dedication of resources for a specific outcome. These kinds of agricultural challenges exist everywhere. There is not a shortage of need." 🌱

CONTINUED FROM P. 32

computer technology. We hired our first information technology employee in 1994 and sent our first texts by cellphone in the early 2000s. The rate of technology change became rapid, and we worked to stay current on the technology curve.

As I begin my 40th year at the place we now call the Noble Research Institute, I feel fortunate to be part of this organization. The organization, which now employs nearly 400 people, has allowed me to grow professionally and personally by supporting me with resources and surrounding me with great people. With the recent name change and separation of activities, the trustees and leadership have positioned us well for future success. However, the most valuable asset of this organization is its people. Our future is only limited by what we can imagine. I am thankful for having been a part of the Noble Foundation's history, and I am excited to be part of the Noble Research Institute's future.

THE TRUSTEES AND LEADERSHIP
HAVE POSITIONED US WELL
FOR FUTURE SUCCESS. ...

OUR FUTURE IS ONLY LIMITED BY WHAT WE CAN IMAGINE.



Research Education Consultation

The men and women of the Noble Research Institute make it their business to gain research-based knowledge, drive innovation, and offer education to enhance agricultural productivity near and far.

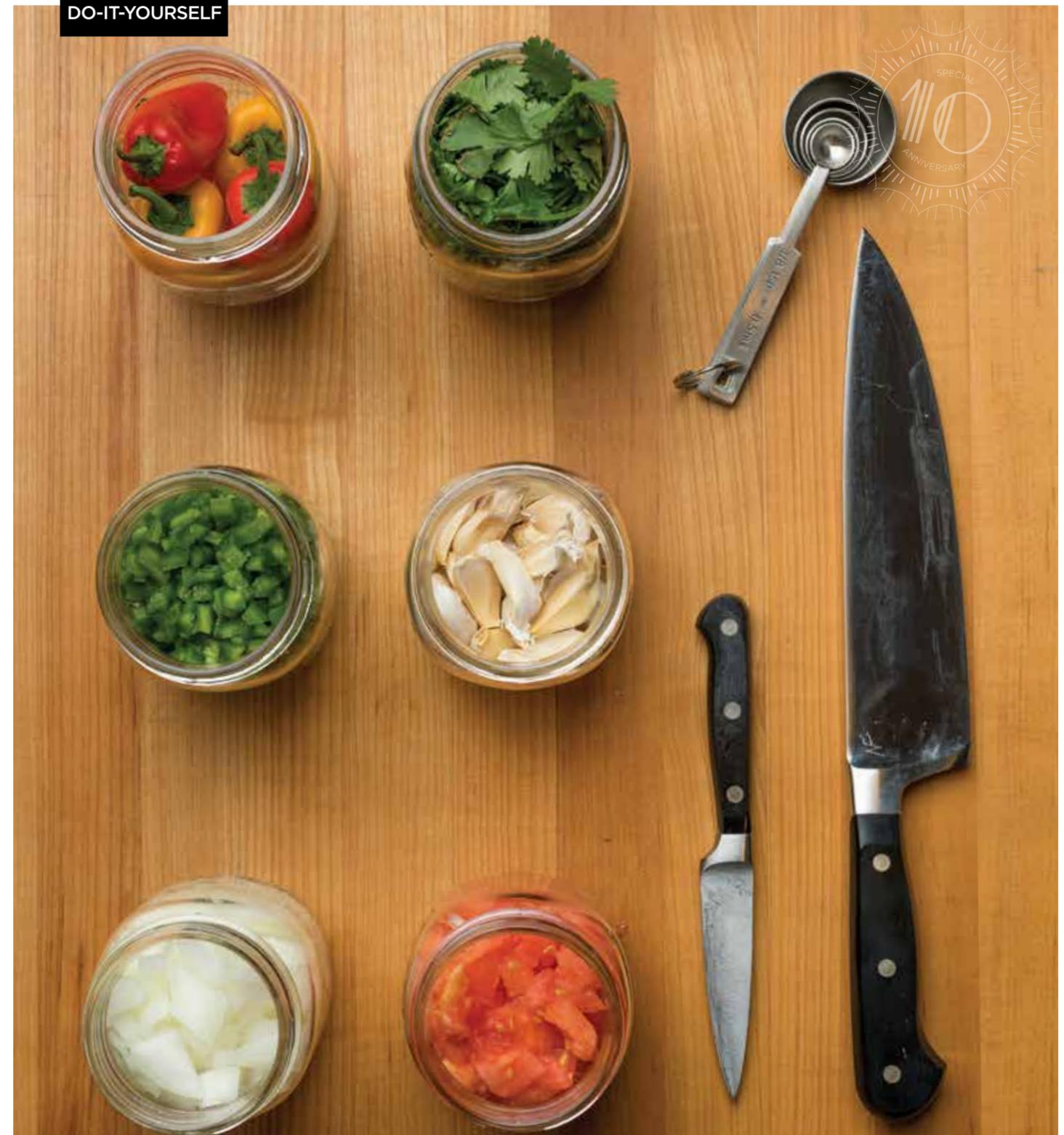
Why? Because benefiting the people who grow food and care for the land benefits us all.

Serving Ardmore and beyond since 1945.



noble.org facebook.com/nobleresearchinstitute twitter.com/nobleresinst youtube.com/nobleresearchinstitute instagram.com/nobleresearchinstitute

DO-IT-YOURSELF



FROM OUR KITCHEN TO YOURS

The holidays are quickly approaching, which beckons thoughts of family gatherings, friends and plenty of our favorite foods. If you're in the market for a perfect gift, we suggest looking no farther than your own kitchen. You can turn basic ingredients into holiday treats for your loved ones (and yourself). On the following pages, you'll find a step-by-step process for how to can salsa without a pressure cooker. And since no Thanksgiving or Christmas is complete without pie, we share one of our best-loved pecan pie recipes. Remember, everything you see on the following pages is made possible by agriculture. Enjoy.

Canning Tomato Salsa Using a Hot Water Bath

You can preserve fresh foods by canning, which uses heat to kill naturally occurring microorganisms. The easiest way to get started is by using the hot water bath method. Use this method to can highly acidic foods (those with a pH lower than 4.6) – including this salsa recipe – without a pressure canner.

INGREDIENTS

7 quarts peeled, cored, chopped paste tomatoes (we used Roma)	2 cups bottled lemon or lime juice
4 cups seeded, chopped long green chiles (we used Anaheim)	2 tablespoons salt
5 cups chopped onion	1 tablespoon black pepper
½ cup seeded, finely chopped jalapeno peppers	2 tablespoons ground cumin (optional)
6 cloves garlic, finely chopped	3 tablespoons oregano leaves (optional)
	2 tablespoons fresh cilantro (optional)

Yields: About 16 to 18 pints

DIRECTIONS

Step 1: Wash all vegetables under cold water, and chop peppers and garlic. (Note: Wear plastic or rubber gloves and do not touch your face when cutting hot peppers. If you do not wear gloves, wash your hands with soap and water before touching your face or eyes.)

Step 2: Blanch the tomatoes by dipping them in boiling water for about 30 to 60 seconds then immediately transferring them to cold water. Slip the tomato skins off, remove the cores and seeds, and chop the remaining tomato.

Step 3: Wash at least 16-18 canning pint jars. Place clean jars in a large stockpot with enough water to keep jars submerged. In a smaller sauce pan, cover at least 16-18 lids with water. Bring the water in both pots to a simmer (180 degrees F) until you are ready for Step 5.

Step 4: Combine all ingredients except cumin, oregano and cilantro in a large pot. Bring to a boil, stirring frequently. Reduce heat and simmer 10 minutes. Add cumin, oregano and cilantro, and simmer another 20 minutes. Stir occasionally.

Step 5: Pull jars out of the hot water. Pour hot salsa into one or two hot jars at a time. Leave about ½-inch headspace between the food and the top of the jar. Use a plastic (not metal) spatula to release air bubbles in the jar. Slowly turn the jar while moving the spatula up and down the inside of the jar to allow air bubbles to escape. Use a damp paper towel to wipe off the rim of the jar. Place the preheated lid on the jar, and fit the metal screw band over the lid and tighten.

Step 6: Repeat Step 5 until you have a full canner load (this will depend on the size of the pot you use; ours holds about nine jars).

Step 7: Load jars into a boiling water canner or large stockpot filled with water. The water should be at least 1 inch over the top of the lids. Cover with a lid and bring to a rolling boil.

Step 8: Let process (boil) for 15 minutes.

Step 9: Turn off heat and remove lid. Let jars cool in canner for about 5 minutes, then remove. Space jars evenly with approximately 2 inches of space on all sides. Repeat steps 5 through 9 until you've canned all the salsa.

Step 10: Let cool for 12 hours, then test seals. You will hear lids pop while they are cooling and sealing. If, after 12 hours, the lid is not tightly sealed to the jar, it should not be stored unrefrigerated.



This recipe was originally published as part of the U.S. Department of Agriculture's Complete Guide to Home Canning, 2015 revision. It is important to follow proper procedures when canning to safely preserve food. We recommend reading the guide at bit.ly/canning-guide. Learn more about food pH and canning from Oklahoma State University at bit.ly/food-tech-facts.

OTHER FOODS TO HOT BATH

Not all foods can safely be canned using the hot bath method. Less acidic foods (pH higher than 4.6) require a pressure canner to achieve hotter temperatures to kill off microorganisms. This is why you should not significantly adjust recipes (such as for salsa) when hot water bath canning. Add too much onion, and you might skew the pH levels.

Here are some other foods you can hot bath.

- Apples
- Cherries
- Grapes
- Peaches
- Pears
- Pineapples
- Plums
- Rhubarb
- Tomatoes
- Pickled Vegetables

For ideas and tips about growing your own salsa-making ingredients, check out our online resources for backyard gardening and commercial-scale horticultural production at bit.ly/garden-info.





Pie crust recipe adapted from Adam and Joanne Gallagher's Inspired Taste recipe available at bit.ly/flaky-pie-crust. Pecan pie filling recipe adapted from Trisha Yearwood's recipe in *Georgia Cooking in an Oklahoma Kitchen* and available at bit.ly/pecan-pie-recipe.

Homemade Pecan Pie

We're big fans of pecans, so showcasing this tree nut in a traditional American pie sounds like a tasty idea. Here are step-by-step instructions on how to make a pecan pie from scratch.

PIE CRUST INGREDIENTS

2 ½ cups all-purpose flour
1 teaspoon salt
1 cup (2 sticks) very cold unsalted butter
6-8 tablespoons ice water

Yields: 2 unbaked pie crusts

PIE FILLING INGREDIENTS

1 cup light brown sugar, packed	2 tablespoons milk
½ cup white sugar	1 tablespoon all-purpose flour
2 eggs	1 ½ teaspoons vanilla
1 cup pecans, chopped	1 9-inch pie crust, unbaked
½ cup (1 stick) butter, melted	1 cup pecan halves

Yields: 1 pecan pie

DIRECTIONS

Step 1: Make your pie crust. In a medium bowl, stir together 1 ½ cup flour and salt until combined.

Step 2: Cut the butter into ½-inch cubes. Scatter the butter into the flour-salt mixture so that butter is completely covered. Use a pastry blender or fork to cut the butter into the flour mixture. This will create a coarse texture. Add the remaining 1 cup of flour, and continue cutting the butter into the flour until flour is evenly distributed. You should end up with a crumbly flour-butter mixture with crumbles being pea-sized.

Step 3: Pour 6 tablespoons of ice water into the mixture, and use your hand or a spatula to pull the dough together into a ball (be patient with the dough; it comes together gradually and won't be a perfect ball at this stage). If the dough is not coming together because it is too dry, add some more water a tablespoon at a time.

Step 4: Place the dough on a clean, floured surface and form into a ball. Divide the ball in half, and roll each half into a ball then flatten into a disc. Wrap each disc in plastic wrap and refrigerate at least an hour and up to two days. Pecan pie is traditionally a one-crust pie, so you can make a second pie with this crust recipe or freeze the second disc up to three months.

Step 5: Preheat your oven to 400 degrees F in preparation for pre-baking the pie crust.

Step 6: Roll out one chilled pie crust disc. Place the dough on a lightly floured working surface. Using a rolling pin, roll out the dough to a 12-inch circle (about ⅛-inch thick). Prevent the dough from sticking to the working surface by making sure the dough is dusted in flour as it is rolled out. You may need to flip the crust over and dust more



flour on it before rolling it out further, but be gentle. *Tip:* When flipping the crust over or transferring it to the pie pan, gently fold one side of the dough over on itself to better distribute its weight.

Step 7: Transfer the rolled out pie crust to a pie pan, and gently press the dough into the dish so that it lines both the bottom and the sides. The dough should drape over the edge of the pan. Trim the crust so that the dough drapes within ½-inch of the edge. Fold the edges of the dough underneath itself to create a thicker, ¼-inch edge on the rim of the pie pan. Crimp using your fingers or a fork. Use a fork to pierce small holes into the sides and bottom of the crust to prevent air bubbles. Refrigerate another 20 minutes or freeze 5 minutes.

Step 8: Prebake the pie crust at 400 degrees F for about 20 to 30 minutes or until the crust is golden. To prevent the crust from turning black, you can cover it with aluminum foil. Pull the crust out of the oven and brush the bottom and sides with an egg wash (1 egg yolk plus 1 tablespoon of cream; or 1 to 2 egg whites). Bake another 3 to 5 minutes until egg wash is dry and shiny. Cool crust before filling.

Step 9: Preheat the oven to 325 degrees F, and make the pecan pie filling. Mix the sugars and eggs together in a large bowl. Add the chopped pecans, melted butter, milk, flour and vanilla, and stir. Pour the filling into the cooled pie crust, and arrange the pecan halves on top of the pie in a circular pattern.

Step 10: Bake the pie for 55 minutes. The pie is ready when the filling is firm and only slightly jiggles in the middle when the pan is gently shaken. Let the pie cool before serving.

DID YOU KNOW?

Texas ranks third among top pecan-producing states in the U.S., and Oklahoma ranks fifth. One research objective at the Noble Research Institute is to find answers to pecan producers' questions about pecan growth and production. Find more of what we do for pecan growers at bit.ly/pecan-info.

OCTOBER

24 INSECT TALES: HIGH DRAMA IN SMALL PLACES



Mark Moffett, Ph.D.

7 p.m. | Tues., Oct. 24
Ardmore Convention Center
2401 N. Rockford Road
Ardmore, OK 73401

Is conservation only about the big things, such as lions, tigers and bears? Oh my ... certainly not! Mark Moffett's goal is to inspire his audiences to care about the obscure creatures: romantically inclined Sri Lankan spiders or dancing Brazilian frogs, 100-foot-wide (30.5-meter-wide) swarms of bloodthirsty army ants of Ghana, or the multicolored "Doctor Seuss" flies of New Guinea. No one else knows these stories firsthand or can convey them with Moffett's enthusiasm.



NATIONAL GEOGRAPHIC LIVE

PROFILES and PERSPECTIVES

Profiles and Perspectives are free and open to the public. For additional information, call Adam Calaway at 580-224-6209 or visit www.noblefoundation.org/profiles.



26 DEER PROCESSING WORKSHOP

2-6:30 p.m. | Thurs., Oct. 26
Noble Research Institute Pavilion
2510 Sam Noble Parkway
Ardmore, OK 73401

Registration fee: \$20, includes dinner

This workshop will teach participants how to take a deer from the field to the table. Experts will teach proper animal handling techniques every step of the way. Participants will learn how to field dress, package and cook deer.

Target audience includes anyone interested in wildlife, hunters and cooks.

NOVEMBER

7 TECHNOLOGIES ON THE RANCH

1:30-5:30 p.m. | Tues., Nov. 7
Noble Research Institute Oswalt Ranch
18414 Dixon Road
Marietta, OK 73448

No registration fee

What impact does technology have on the ranch? Join us for discussion and demonstration of the technologies used on the Noble farms and ranches with beef cattle, forage, soil and wildlife. Some demonstrations will include ultrasound, carbon monitoring, UAVs and tracking technologies.

Target audience includes producers who want to get up close and personal demonstrations of technologies that are part of the future of farming and ranching.



30 MANAGING TAXES FOR AGRICULTURAL PRODUCERS

1:30-4:30 p.m. | Thurs., Nov. 30
Southern Tech, Seminar A
2610 Sam Noble Parkway
Ardmore, OK 73401

No registration fee

With lower farm incomes, managing taxable income will be of great importance this year for agricultural producers. Experts in farm taxation issues will provide the latest information at this seminar.

Target audience includes producers interested in an update on tax rules and a better understanding of how different tax codes apply to their operations.

For more information or to register for one of our agricultural events, visit www.noble.org/events or call Danielle Pacifico at 580-224-6376. Preregistration is requested. If you have other agricultural questions, please call our Ag Helpline at 580-224-6500 or submit a question using the online form at nobleapps.noble.org/aghelpline.



SOME THINGS NEVER CHANGE

Noble's name and legal structure may change, but its spirit remains rooted in its mission and the people who breathe life into it.

by J. Adam Calaway, editor

Thick, heavy, dusty volumes have been written about change. And, frankly, I have nothing new to add. Scary. Inevitable. Exhilarating. Change happens.

Organizations experience continual change. New employees join the fold. Areas of programming evolve. And sometimes - ever so rarely - there's a shift so profound that it earns its own display case in the company museum.

Welcome to last spring. The run-up to the announcement of our transition from the Noble Foundation to the Noble Research Institute resembled *The Flash* in fast forward. More than just activity, we understood the magnitude of our efforts; we were stitching together a historic moment.

Becoming the Noble Research Institute undoubtedly will open new opportunities and reap great benefits in the future. Still, standing on the edge of the unknown inevitably evokes some hesitation. Looking at the changes on paper, there really was no downside. But what were those unforeseen outcomes? How would it change us?

I found my answer in the cafeteria a few days after the announcement. Janice Pierce, one of our food service assistants, greeted me with the same warm smile and phrase as she has for the last decade. "How are you today, fine sir?" she asked. You just can't help but smile when Janice calls you "fine sir." Those words are but a single thread (kindness) in our organizational tapestry, but they exemplify the unshakable spirit of Noble.

As I walked through the ensuing weeks, interaction after interaction revealed thread after thread.

Despite the fact he's a vice president, Steve Rhines continues to jump out of corners to scare me. He thinks it's

hysterical, and so do I (thread: humor and fun).

Every meeting, every time you cross paths with Hugh Aljoe he extends a vise-grip handshake and friendly greeting because he's a real cowboy right down to the manners (thread: courtesy and integrity).

Rick Wallace, one of our greenhouse operation specialists, and I play Monday morning quarterback almost every week, bemoaning or praising our beloved Dallas Cowboys (thread: camaraderie).

Jeff Moen walks around offering energetic high-fives every Friday while saying "It's a great day to be Noble," (thread: passion).

And the list goes on and on through every laboratory and office. Person after person representing another thread, all woven together into this remarkable place we call Noble.

See, we may change legal structure and branding, programs and projects, but the spirit of this organization remains rooted in our mission and the people who breathe life into it.

Noble is, has and always will be dedicated to providing solutions to great agricultural challenges. We have followed this singular vision since our founder, Lloyd Noble, endowed this great organization 72 years ago. We have changed tactics for achieving milestones, but the destination has remained the same.

Each generation brings change, but a belief in the integrity of our pursuit generates an energy that permeates every person here.

We have become the Noble Research Institute. That was the next step. We took it. But our purpose and our spirit remain the same.

Some things will never change. And that's one of them. 🌱

NOBLE IS, HAS AND ALWAYS WILL BE DEDICATED TO PROVIDING SOLUTIONS TO GREAT AGRICULTURAL CHALLENGES.



LLOYD NOBLE SCHOLARS IN AGRICULTURE



Paid internship



Housing offered



Multi-disciplined

APPLY ONLINE BY FEB. 6

ONE NOBLE SUMMER IS ALL IT TAKES

to make a difference in agriculture and discover your future. Contribute to the Noble Research Institute's farm and ranch research and work side-by-side with consultants who assist land managers in the Southern Great Plains.

Apply and learn more at www.noble.org/summer-scholar



Noble Research Institute, LLC
2510 Sam Noble Parkway
Ardmore, OK 73401

Nonprofit Org.
U.S. Postage
PAID
Permit No. 1234
Oklahoma City, OK

PLEASE DELIVER TO:

Firstname Lastname
1234 Street Name Dr.
Cityname, ST 12345

 **LEGACY** | Fall 2017 | Vol. 11, Issue 1



The Noble Research Institute, formerly known as the Noble Foundation, has a new brand. But the organization remains dedicated to delivering solutions to great agricultural challenges.