

A publication of The Samuel Roberts Noble Foundation

# Legacy

Winter 2011

## OIL FIELD WARRIORS

*Lloyd Noble's secret mission  
in Sherwood Forest helped save  
Britain during World War II*







*(on the cover) In a little known story from World War II, Lloyd Noble, oilman and founder of the Noble Foundation, sent equipment and men to drill for oil in England, which was in dire need of energy resources. The successful mission produced more than 2 million barrels of oil within the first year alone. The cover symbolizes the American and British union which recovered desperately needed petroleum from beneath Sherwood Forest.*

*(above) Sakae Hisano, research assistant, checks the growth of seedlings in a controlled environment chamber. The machines allow exact regulation of light, temperature and humidity to allow scientists to reproduce plant growth experiments. These chambers in the basement of the Noble Foundation greenhouse are just a few of 75 such machines on the Ardmore, Okla., campus.*





## Cover Story

### 18 Oil Field Warriors

During the darkest days of World War II, England's energy reserves ran dangerously low. The country discovered oil in famed Sherwood Forest, but was unable to extract it until Lloyd Noble joined a secret mission.

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## Envisioning Tomorrow

I will open my last president's message the same way I began my first: This year will be remembered as a transition year at the Noble Foundation.

I originally penned those words in 1992. I was the organization's incoming president, full of enthusiasm at the new adventure before me. Two decades later, the Noble Foundation is once again experiencing transition. This time, however, I will be exiting this office instead of entering.

The next time you read a Noble Foundation publication, Bill Buckner, my successor, will be writing to you from this page. I see in his eyes the same energy and passion for this organization that I still feel in my heart.

Change is here. I'm ready, Bill is ready and so is the Noble Foundation. So in my last president's message, I turn my focus back to our founder Lloyd Noble.

I had a friend say to me once, "Mike, I sure do like your publications, but you guys talk too much about Lloyd Noble."

It's difficult not to. His generosity is the reason this organization exists. His bold and clear mission – "benefit mankind by assisting agricultural producers" – stands at the core of our organization. And though he died some 60 years ago, the tenets of his life – generosity, passion and dedication – have provided guidance and inspiration for many decisions regarding the operations of this organization.

But when I think of Lloyd Noble, I am most amazed by his vision. Despite being a businessman and one of Oklahoma's famed oilmen, he applied his resources to agriculture. Having experienced the Dust Bowl and its devastating effects on the economy and the people, Noble looked beyond the immediate circumstances and envisioned an enduring solution to revitalize agriculture in the region – The Samuel Roberts Noble Foundation.

He invested his significant personal wealth because he saw beyond the tragedy, the emotion, even his personal wants, to the greater need. Noble said, "The land must continue to provide for our food, clothing and shelter long after the oil is gone."

He looked past his own finite existence and focused on the power and significance of the land. The land was the common denominator. It bound us together. It provided for our fundamental needs. It needed to be preserved. And so he took action.

Noble had countless attributes to be admired, but his uncommon vision is the most remarkable. So in the spirit of seeing beyond today, I look ahead and I anticipate tomorrow for the Noble Foundation and for myself.

I see this organization climbing to new heights of excellence and expanding its reach further, helping exponentially more people in this country and beyond.



Personally, I see my six young grandchildren with their sticky hands reaching up to me. I envision the world they'll experience, one of profound challenges and endless possibilities. I see many years of me and my wife tending to the gardens of their lives.

I see need, and I see hope, but I know there are selfless, big thinkers like Noble who will rise up to meet the adversities of tomorrow with energy, devotion and vision.

And as I think of all these things, I am reminded of a speech Noble gave just a few years after he initiated this great experiment of the Noble Foundation in which he said, "As I look around at the strides that have been made in our research laboratories, as I look at the things undreamed of a few years ago ... the only degree to which we have reached the end of the road of opportunity is the degree to which we have exhausted the imaginative capacity of the human mind."

So, I say goodbye with a sense of appreciation for a Board of trustees that has been devoted to the founder's wishes and supportive of our efforts; for the organization's employees who have been dedicated in their service; for our friends in the non-for-profit industry, the local community, state and nation, who have extended to us their courtesy, support and, where applicable, prudent stewardship of our investments.

And, I say goodbye with a sense of excited expectation to see the benefit to mankind emanating from the Noble Foundation for the next 20 years and beyond.

With appreciation, expectation and very best regards, I am

Sincerely yours,

A handwritten signature in dark ink, reading "Michael A. Cawley". The signature is fluid and cursive, with a large, stylized 'M' and 'C'.

Michael A. Cawley  
President and Chief Executive Officer



# Notables

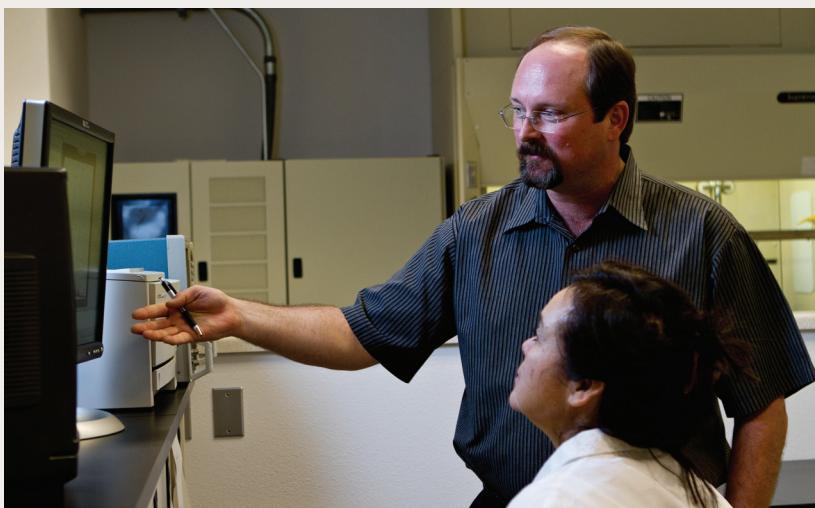
## Board of Trustees selects Bill Buckner as new president, CEO

The Samuel Roberts Noble Foundation Board of Trustees has selected Bill Buckner as the organization's new president and chief executive officer (CEO).

Buckner, who will begin his tenure on Jan. 16, 2012, most recently served as president and CEO of Bayer CropScience LP and has more than 30 years of experience within various agricultural industries.

"Bill Buckner is a proven leader with great integrity and foresight," said Vivian DuBose, chair of the executive search committee and granddaughter of the organization's founder, Lloyd Noble. "The board is confident that he will continue the Noble Foundation's tradition of excellence and advance our mission to improve agriculture for the benefit of mankind."

Buckner becomes the eighth president in the Noble Foundation's 66-year history. He will replace Michael Cawley, who is retiring after two decades of leading the organization based in Ardmore, Okla.



## Grant offers new tools to solve plant mysteries

Professor Lloyd W. Sumner and a team of colleagues received a \$1 million grant from the National Science Foundation (NSF) to purchase a Nuclear Magnetic Resonance Spectrometer (NMRS) to aid their research.

Using similar principles as an MRI for humans, the NMRS employs powerful magnets and megahertz radio frequencies to allow researchers to better identify chemicals within plants and to better understand how molecules are assembled. This knowledge

provides a foundation for understanding the complex biochemistry within a broad range of plant systems.

Sumner's lab examines compounds produced within plants when they are confronted with stresses like drought and disease. Using advanced scientific instrumentation, they sort and weigh molecules to determine the chemical makeup of these compounds. They then can search for the mechanisms and genes that produce the compounds.

## Summit seeks to chart the future of plant science

The American Society of Plant Biologists (ASPB) recently brought together more than 75 scientists from across the plant science research community to chart the future of the field. Noble Assistant Professor Maria Monteros, Ph.D., was one of the scientists selected to attend this first ever Plant Science Research Summit, held at the Howard Hughes Medical Institute.

The summit brought together representatives from a broad spectrum of plant science research areas to identify research priorities in plant science that can positively impact challenges in areas such as health, energy, food and environmental sustainability. A report of the Plant Science Research Summit findings is expected to be completed in early 2012.







# The Fate of Phosphorus

Wolf Scheible joins the Noble Foundation to seek solutions to one of the world's most pressing and overlooked problems

by J. Adam Calaway

**W**olf Scheible, Ph.D., is researching a problem that most people don't know exists. Scheible, the Noble Foundation's newest principal investigator, comes to the organization from Germany's esteemed Max Planck Society. He brings almost 20 years of research to bear in his exploration of how plants efficiently use nutrients, especially phosphorus.

Most of the world's population gives little thought to phosphorus, much less how plants use it, but every living organism depends on this chemical element. Phosphates (natural compounds that include phosphorus) are a building block of life, present in DNA and RNA. They are also a key to production in agriculture.

Phosphorus-enriched fertilizer promotes abundant, healthy, high yielding plants. It is a linchpin for growing food, and the world is running out of readily accessible rock phosphate, the main source of phosphorus fertilizers.

"The majority of the world is just now becoming aware of this serious problem," Scheible said.

*Wolf Scheible, Ph.D., is the Noble Foundation's newest principal investigator.*

In the 1960s, the Green Revolution spread modern agricultural practices around the world and dramatically increased the demand for phosphorus-based fertilizers. With the global population set to increase from 7.0 to 9.1 billion in the next 20 years, the demand for food and plant biomass for energy production will drastically increase as will the need for phosphorus.

The Global Phosphorus Research Institute estimates that mining can only provide enough phosphorus to meet the increasing demand for 30 to 40 years. "You cannot substitute something for phosphorus, and you can't grow food without it," Scheible said. "We have to think hard about how we are going to use our resources. My research looks at how we can get the plant to better use phosphorus and other nutrients. If they use them more efficiently, then we will use less fertilizer and the world's supply will last longer."

## Equations and Tanks

Scheible's research – as with his journey to the Noble Foundation – builds on a lifetime engrossed in science. For Scheible, science and mathematics are seemingly encoded into his genetic makeup. His family tree boasts a litany

of professionals in both fields. His father was a math professor. His grandfather, uncle and mother were architects. Of his three siblings, two are mechanical engineers.

As a child, Scheible spent hours engrossed, not in fairy tales, but in a math book, contemplating riddles most children would only see on a test. Math eventually gave way to chemistry. He built rockets using potassium nitrate and tissue paper. "I never burned anything down," he said with a sly smile. "But I could have very easily."

By 16, Scheible honed in on food science and became engaged in biochemistry, which manifested itself as a desire to become a medical doctor.

However, Germany's conscription required him to enlist in the military for 15 months during the mid-1980s. He traded solving equations for driving tanks. The time serving his country proved invaluable and redirected his interests.

During his stint in the military, Scheible became interested in physiological biochemistry. By 1986, he had completed his service and was studying his new passion at the University of Bayreuth where he earned a diploma (a five-year degree that is like combined bachelor ►



and master's degrees in the United States).

At Bayreuth, he also met his future doctoral mentor, a young professor named Mark Stitt. "He inspired in many ways," Scheible said. "Maybe it was his long, curly hair or John Lennon glasses, but he was passionate and brilliant."

Scheible and Stitt formed a lasting collaboration. When Scheible graduated in 1992, he spent six months at Versailles in France preparing for his doctoral work, then, late in the year, he followed Stitt to the University of Heidelberg to research nitrate signaling and nitrate reduction. They discovered that the nitrate ion itself, not a product of its metabolism, is a key signal that regulates gene expression, nitrogen assimilation and carbon metabolism in plants.

"This was a significant breakthrough," Scheible said. "Signals within plants continue to play a role in my research."

Scheible graduated in 1996 and served as a postdoctoral fellow from 1997 to 2000 at the Carnegie Institute for Plant Science at Stanford University under the guidance of Chris Somerville, Ph.D. During his postdoctoral stint, he studied cell wall biosynthesis – an important process for the production of biofuels from plants. Under Somerville, he identified two of the first plant cellulose synthases that are required for biomass production.

At the same time, Stitt had become Director of the Max Planck Institute of Molecular Plant Physiology (MPI-MPP). Soon, Scheible's mentor came calling and made him a group leader in 2001. At the MPI-MPP, Scheible focused on nutrient use efficiency in plants. He would spend a decade becoming one of the world's foremost experts on the subject.

## The Ardmore Connection

Scheible's time at the MPI-MPP afforded him the opportunity to form collaborations with many of plant science's leading researchers, including Michael Udvardi, Ph.D., a former MPI-MPP group leader, who came to the Noble Foundation in 2006.

When Scheible began looking at the next phase of his career, he saw an opening at the Noble Foundation and reached out to his friend and collaborator. "It was an exciting possibility to add a researcher of Wolf's caliber to an already excellent group of scientists," Udvardi said.

Rick Dixon, D.Phil., director of the Noble Foundation's Plant Biology Division, echoed Udvardi's sentiment. "Dr. Scheible is a phenomenal researcher. He brings a wealth of experience and insight to the Noble Foundation," he said. "Scheible, Udvardi and several other principal investigators will collaborate on projects aimed at plant productivity and sustainability."

For Scheible, the chance to come to the Ardmore, Okla.,-based organization was equally important. "The Noble Foundation offers researchers so many advantages – tremendous facilities, unparalleled support and two other divisions that can help move research from the laboratory to the field."

Scheible will begin at the Noble Foundation in January 2012. His goals are to advance the technology to investigate plant genomics, while focusing on nutrient use efficiency in plants and specifically the looming phosphorus crisis.

## No More Lazy Plants

In the simplest of terms, Scheible said

crops are lazy in their use of nutrients. They take in only a fraction of the nutrients agricultural producers provide, letting the rest go to waste. The remaining fertilizer is used by microbes or runs off and negatively impacts the environment. "We put a lot of fertilizer on the field and plants take up too little," Scheible explained. "My research ultimately will help develop plants that use phosphorus more efficiently and reduce fertilizer use."

To achieve this, Scheible must define the relationship between plants and nutrients like nitrogen and phosphorus. Much like responding to drought and disease stresses, a plant will respond to nutrient stresses. When a plant requires more nutrients, it signals its roots to grow and seek more intake. When it is stressed for carbon, it puts out more leaves for photosynthesis.

"These signals are central to understanding a plant's stress responses," Scheible said. "The signals originate in the shoots and then go up or down the plant. These signals are important for understanding and correcting nutrient limitations."

Scheible will also examine how wild species manage phosphorus efficiency. Researchers have uncovered areas in southwest Australia and South Africa where the soils contain few nutrients, but the plants are thriving.

"We want to know what they are doing to survive," he said. "Then we want to transfer that ability to crop plants or develop that nutrient uptake system in crops. Efficient plants will be vital to keeping production agriculture going and feeding the world while using fewer inputs." ■











# Put to the Test

Noble Foundation small grains variety trials have provided invaluable agricultural information for almost five decades

by Debra Levy Martinelli

For nearly 50 years, farmers in the Southern Great Plains have had access to a tool that helps take the guesswork out of small grains production.

The Noble Foundation's annual *Report of Forage Yields from Small Grains Variety Trials* is a *Consumer Reports* of sorts for agricultural producers. The report, produced by the organization's Agricultural Division, evaluates and compares commercially available and emerging experimental varieties of oats, rye, wheat and triticale, a rye/wheat hybrid. More than a dozen public and private breeding programs submit the new varieties for inclusion in the annual testing, including the Noble Foundation's own Forage Improvement Division, where basic plant science research is translated into tangible plant varieties.

Through the past decades, the Noble Foundation has become the primary location in the Southern Great Plains

for both small grains testing and breeding. While numerous universities and companies work in small grains, most do not have the resources to fully conduct the research or the testing. The Noble Foundation's historical relevance plus its resources, including 12,000 acres of farmland across southern Oklahoma, allow the organization to have a continued impact on the discipline.

"Small grains have numerous economic endpoints for the region," said John Blanton, Ph.D., agricultural research programs manager. "Not only do the breeding and testing programs impact the grain-based production, but there is a dual-use endpoint with the stocker cattle industry. Producers in this area depend on small grains for grazing, making the outcomes of this even more important."

## Small Grains. Big Potential.

Established in the early 1950s, the Noble Foundation's small grains breeding program focuses on rye, wheat, oats and triticale, which are typically planted in mid-September and, depending on the species, complete their life cycle between the following April and June.

"Early in our history, we recognized a need to have a small grain for fall and winter forage production,"

explained Wadell Altom, former director of the Agricultural Division and 43-year employee of the Noble Foundation. "Small grains are important in this region to meet the needs of livestock producers from mid-fall to spring when there aren't a lot of grazing options due to the dormancy of warm-season grasses."

As new small grains were developed, Noble Foundation scientists also recognized the need to test them against what could be obtained in the marketplace. So the small grains variety trial program was initiated in 1966.

"To know if what you are breeding is better than what is already out there, you have to compare it," Altom said. "Our trials started small, comparing Noble Foundation varieties to those available commercially, and grew to include potential varieties being developed by universities and other research institutions. There was a good collaborative exchange of new materials among all kinds of entities in the small grains breeding business."

While those entities had materials to be tested, they lacked the land and other resources required to conduct the trials. The Noble Foundation had all of those resources, plus the organization had earned a reputation as a leader in improved grains after the enormously ►

*(opposite) Staff Scientist Jagadeesh Mosali, Ph.D., examines the progress of wheat in a variety trial at the Noble Foundation's Dupy Farm north of Ardmore, Okla. In the background, Agricultural Research Assistant Kevin Lynch takes growth measurements of the small grain.*



successful release of Elbon rye in 1956, which is still commercially available.

With the release of Elbon rye, researchers began comparing both grain yield and forage yield. “Before we began our work in the 1950s, farmers focused only on grain yields,” Altom said. “Our research shifted the emphasis to small grains grown primarily for forage, changing the way farmers looked at grain production.”

Today, Agricultural Division Staff Scientist Jagadeesh Mosali, Ph.D., coordinates the small grains trials. “Each year, we evaluate new small grains crops for feasibility and performance,” Mosali said. “The data generated from these evaluations provides farmers with extra information to aid in their annual crop decision making process.”

His predecessor, Jerry Baker, Ph.D., agrees. “What’s great about the Noble Foundation is that it has a practical connection with farmers that allows the researchers to get feedback about what the farmers need,” said Baker, who ran the variety trials from 1993 until his retirement in 2004.

### Rigorous Trials

Offered at no cost to participants, the trials are conducted at two Noble Foundation research farms that represent common soil types in the Southern Great Plains. This ongoing evaluation process is designed to rigorously evaluate entrants to ensure accurate and useable information is relayed to both the farmers and seed producers.

At the end of June, germplasm entrants are recruited from commercial producers, universities and research organizations in the United States and Canada that have established small grains breeding programs.

Typically, Mosali receives samples from at least 15 organizations, and each brings a different mix of entries that may have value to small grains producers.

“As established lines evolve and new lines get closer to commercialization, we compare what each line is capable of producing,” Mosali said. “While the bottom line is critical to our commercial partners, they want to produce product that has value for the farmer.”

When the seed samples arrive (no

later than Sept. 1), Mosali documents the source, divides them by crop and germinates them in an incubator. By mid-September, depending on weather, seeds are planted in 5-foot by 10-foot plots of each variety, with three replications for each plot. For example, the 2010-2011 trials included 22 entries of wheat, four of oats, 10 of rye and seven of triticale.

“To know if what you are breeding is better than what is already out there, you have to compare it.”

*Wadell Altom  
Former director, Agricultural Division*

Each variety is planted according to normal producer practices; during the growing season, soils are tested, plots are fertilized and plants are treated for pests according to best management practices. “We replicate what farmers would do to their crops,” Mosali said. “Our goal is to keep each plant on an equal footing to make sure the outcomes are unbiased.”

Harvest times for the trials vary according to crop and purpose. In 2010-2011, small grains varieties designed for forage-only production systems were harvested in December, February, March and April. Dual-purpose varieties (those used for both grazing and grain) were harvested for forage in December and February, and for grain in June.

At the completion of the annual variety trial, Mosali and his colleagues analyze the production outcomes for all varieties and publish a fact sheet which details data on forage and grain yields by crop and variety. These fact sheets are available to farmers, seed producers and researchers, and can be obtained from the Agricultural Division in both paper and electronic formats.

“When studying the fact sheet, farmers should look for consistency and dependability of performance for a variety across multiple years and environments rather than within a single year,” Mosali said.

“They also should take into account the location that best matches their production situation – soil type, location proximity, yield goals and fertility levels – when using this information in their decision making process.”

Come late summer, when the trials have been completed and the fact sheet has been published, the time will come for Mosali to start the process anew. Like

farming, the Noble Foundation’s small grains trials are a year-round endeavor.

Next year’s small grains variety trial reports will contain a new piece of information not previously included – the identity of the sources of the seeds being tested. Anyone reading the report, whether expert or novice, will know, for example, how a commercial variety produced by a seed company compares with an experimental variety developed by the Noble Foundation.

“The beauty of the trials is that they are completely unbiased,” Mosali said. “It doesn’t matter whether the performance data is good or bad, whether it comes from our organization or an outside entity. It all goes into the report.”

For the Forage Improvement Division, the independence of the trial is crucial.

“When breeders run trials on their own varieties and the results are good, nobody believes it,” said Professor Joe Bouton, Ph.D., who currently leads Noble Foundation commercialization efforts. “By participating in the Noble Foundation trials, we are treated like everybody else and get an independent third-party analysis. When one of our varieties looks promising, it goes head-to-head against what is already commercially available. If it is going to stand up, it has to perform. Potential is nothing. Performance is everything.” ■





*(top, left) Brian Motes, senior research assistant, (left) and Joe Bouton, Ph.D., senior professor, examine a batch of cleaned rye seed destined for a Noble Foundation test plot.*

*(top, right) Motes sifts rye seed to clean it and prepare it for germination and planting in the ongoing variety trials.*

*(bottom) The small grains variety trials are conducted in small plots on Noble Foundation property. The grains are harvested at appropriate times of the year and tested for yield and quality.*







# Game Changer

GrowSafe technology looks to revolutionize research in efficient cattle management

by J. Adam Calaway

On a late summer morning, Billy Cook, Ph.D., wheeled his pickup truck onto the Noble Foundation's Oswalt Road Ranch. Cook, the director of the Agricultural Division, drove by the first pasture and nodded in the direction of a few dozen black cows eating from a single long metal trough.

"That's how we've fed cows since the 1940s – one trough, a bunch of cows," said Cook, watching the cows jockeying for position. "Historically, individual feeding allocations have been based on whole herd consumption. A farmer feeds 1,000 pounds to 100 cows, calculating that each cow will receive 10 pounds

of feed. In reality, some eat more than 20 pounds while others may eat only 5. That's what makes this new technology so important."

Cook drove closer to the ranch's cattle handling facility while discussing the need for better technology in beef cattle research. While the cattle industry has improved various performance characteristics of beef cattle, like yield and quality grade, "feed efficiency" remains the Holy Grail – revolutionary if ever attained, but continually elusive. Infusing the industry with such efficiency would be the single most important advancement made because of the potential impact on the

input costs and thus a farmer or rancher's bottom line.

Feed efficiency ranks among the top categories to study because feed can be 75 percent of the total cost of a beef cattle operation so any improvement in this area can mean significant savings. However, it usually goes unstudied because of the difficulty and expense associated with measuring it.

Farmers and ranchers look for animals that will produce more body mass on the same amount of feed. Research has shown there can be as much as an 8 pound difference in feed intake for animals that produce the same body weight. ►





“That means that two steers gain similar weight, but one eats half a ton more and costs an additional \$150 to feed,” Cook explained. “It all comes back to genetics and how efficiently each animal’s body turns the feed into weight.”

To measure feed efficiency in the past, individual animals had their feed intake and weight gain calculated by hand. Measuring a cow’s weight required a producer or researcher to round up their herd and run them through a chute, giving one data point per animal. For a producer and most researchers, this process was so time consuming and detrimental to cattle performance it was only done a handful of times a year.

Calculating intake is even more cumbersome. Animals are separated and fed by hand two or three times a day. Results from this method are unreliable because the data is skewed by the lack of animal socialization and restricted behavior which results in unnatural feed consumption.

Various methods have been developed to measure feed efficiency since the 1950s with different degrees of success until GrowSafe Systems Ltd., a technology-infused feeding system with the potential to revolutionize the cattle industry.

This spring the Noble Foundation became one of the primary testing sites for GrowSafe. “In just a few months, we’re already seeing the potential outcomes of this technology,” Cook said. “This is a game changer.”

### **The GrowSafe Way**

GrowSafe incorporates advanced feeding systems that record precisely how much

an animal eats and drinks. The GrowSafe feed intake system, which looks similar to a regular trough system, has individual feed bunks that allow only one animal to feed at a time. When an animal enters a bunk, GrowSafe recognizes that animal specifically through a special electronic ear tag, then relays information back to a central computer. This means the animal can feed at any bunk and the computer will compile its feeding behavior.

The second system, GrowSafe Beef records the animal’s weight and water intake. Each cow stands on a front-end scale while drinking at a water trough. The scale can estimate actual body weight with up to 98 percent accuracy. The system runs continuously, collecting thousands of data points to study.

“Think of the data as a picture,” Cook said. “Traditional feed efficiency research would be like looking at one of those children’s View-Masters, where you clicked from a single image to the next. With GrowSafe, it’s like watching high definition television.”

GrowSafe, which requires little specialized labor, interacts with the cows like a traditional feeding system, so they maintain near normal feeding behavior not altered by human interaction.

“We can accurately determine individual feed efficiency on a large scale for the first time in history,” said Ryan Reuter, assistant professor on Noble’s agricultural research team. “And we can accomplish this without biasing results related to animal behavior or human interaction.”

By identifying which animals are naturally feed efficient, researchers can then breed for this heritable trait. Initial

studies have shown that, after just two generations of selecting for this trait, steers and heifers consumed 11 percent less feed, but had similar weights and performances to randomly mated groups.

While feed efficiency studies will certainly be a key outcome, GrowSafe also allows researchers to sneak a peek into animal behavior, which has been a hallmark of the technology since it was first developed.

### **From Ostriches to Cattle**

GrowSafe was founded in 1990 by three engineers, one of who was Camiel Huisma, a mechanical engineer from Holland.

In the early 1990s, the ostrich industry was booming; an egg could be imported from South Africa for \$150. When hatched and raised under quarantine, the ostrich chicks could be sold for as much as \$6,000 each; however, survivability under quarantine was only 8 percent.

Huisma invented a piece of technology (the predecessor of GrowSafe) which weighed the bird and measured the frequency and duration of its intake. Using this system, Huisma discovered that chicks would visit the feeder about 500 times per day. When chicks became ill, feeding behavior changed and visitation dropped rapidly, declining to about 50 visits per day.

This visitation decline could be trended over short time intervals, usually within 4 to 12 hours. In response to the data triggers, avian specialists developed responsive treatment protocols. Survivability was improved from 8 percent to more than 92 percent using the ►





*(top row) Feeds, such as this finishing ration of corn, cotton seed hulls and distiller's grain, are first stored in a commodity barn (center) near the GrowSafe facility and then transferred to individual bins (right) where the cattle eat.*

*(left column, center) GrowSafe feed bins, known as "nodes," sit on load cells that constantly weigh the amount of feed in each container.*

*(left column, bottom) The system's watering stations measure the amount of water consumed by each animal and also weigh each head of cattle every time it comes to drink.*

*(right, bottom) Animals access feed through a set of metal bars. An ear tag (the small yellow tag in this photo) identifies individual cattle and the system records their feed consumption.*



technology and responsive animal health treatment protocols.

The ostrich industry bubble quickly burst, but the fledgling company earned enough capital to start development in the cattle industry. Alison Sunstrum joined GrowSafe in 1999 as part owner and sought to grow the company by expanding the cattle market.

Sunstrum reached out to the Beef Development Center of Texas (BDCT) where a number of producers tested cattle. The farmers and ranchers referred Sunstrum to Cook, the former manager at the BDCT.

“We needed help making the connection to real producers. We’re the data side, the technology side. We don’t have biological overlay or the cattle background,” Sunstrum said. “We produce a lot of data and some of it is noise. We needed people who can interpret the data and focus the research with a practical application. The Noble Foundation was just a logical fit. They bring all the pieces together – a highly knowledgeable operations group, research geared toward the farmer and land resources.”

The application of GrowSafe to beef cattle has already yielded promising findings. Like the ostriches, cattle exhibit similar disinterest in feeding during illness or reactions to medication. “Behavior is a better indicator than you can imagine. They start acting differently before you can see that anything is wrong,” Reuter said. “We’re now able to manage individual cattle. In the past, we managed groups of cattle.”

A potential next step for GrowSafe will be to combine identifying a sick cow with marking it. When an ill animal comes to a feed or water bunk, a special spray paint will mark its back so a producer can easily pull it from the herd and treat it.

“We’re just scratching the surface of what this technology will allow us to do,” Cook said. “We’re certainly going to try and use it in every possible way.”

## Research Projects

Using GrowSafe, Noble Foundation agricultural researchers are seeking

answers to a variety of long held questions that come directly from farmers and ranchers.

Researchers can test types of feed to determine the most efficient gain. They have already tested how different management practices impact feed yard performance and carcass merit of retained calves. Previously, researchers

could only make assumptions about the individual animal outcomes of management styles. Now they know that a variety of management styles are successful in producing similar results.

“GrowSafe removes the guesswork and provides producers with data-driven answers,” Reuter said. “It will improve the way we manage the animals, which is better for the people and better for the cows. It’s a win-win.”

Initial projects have also included transportation stress on weaned calves.

Noble researchers collaborated with Drs. Ron Randle and Tom Welch, as well as Andrea Lloyd (former Noble intern, 2005) from Texas A&M AgriLife Research and Extension Center at Overton on the project.

They divided a set of calves into two groups, shipping one directly to the Noble Foundation, while the other group experienced a longer trip that included unloading and loading.

After the trip, they monitored feed and water intake for 28 days using GrowSafe. The researchers discovered that the second group did experience some initial weight loss, but after the month there was no difference in performance, health or well-being of the cows.

“This means a producer can ship cattle a little farther to get a fair market

without any long-term impact on the well-being of the cow,” Reuter said.

GrowSafe also allows the research to be done more affordably. “Beef cattle research is increasingly expensive,” Cook said. “Now we can improve the functionality, quality and cost of research with one piece of technology.”

The next step is to apply GrowSafe

“We’re already seeing the potential outcomes of this technology. This is a game changer.”

Billy Cook  
Director, Agricultural Division

technology to forage-based beef cattle systems, taking the technology out of the feeding pen and putting it in the field. This fall, GrowSafe Beef systems will be installed on small grains pasture where weight gain from grass, not feed, will be measured. Researchers will now be able to get multiple readings on weight gain as well as the advantages of monitoring cattle behavior through water intake.

Soon, Sunstrum hopes the technology will become cost-feasible for many operations, allowing them the benefit of increased individualized management to increase efficiency, animal health and profitability.

Until then, the benefits to the Noble Foundation’s research are immeasurable.

“The GrowSafe technology means the Noble Foundation will shape research regarding beef cattle,” Cook said. “The results generated from these research projects will have a significant impact across the cattle industry. This is the next generation of cattle research that should allow us to address beef production and forage management issues that previously were impossible or impractical to tackle.” ■

*(opposite) Curt Larson, agricultural research assistant, drives a feed truck to load grain into the GrowSafe system.*











# Oil Field Warriors

Lloyd Noble and 44 roughnecks played a critical role in securing energy reserves that sustained England during World War II

by Kim McConnell

By the fall of 1942, World War II had engulfed the entire planet. Nazi Germany was tightening its hold on Europe, subduing each country in its path and eyeing Great Britain as its next conquest. The United States had joined the war less than a year earlier after the attack on Pearl Harbor, but was focusing its energy on the Pacific.

Soviet Premier Joseph Stalin had requested the Allies form a second front in western Europe, but England was barely holding on. A lack of resources, particularly fuel, was hindering the country's ability to defend itself, much less develop a western front with the United States.

These were the darkest days of World War II for the Allies.

Historians will long remember the iconic battles that turned the war against the Axis countries in 1942 and 1943 – the United States' naval victory at Midway, Russia's winter stand at Stalingrad, the reclamation of North Africa and D-Day.

However, one wartime story is often overlooked because it contains no military offensive, no espionage, not even a single fired bullet. Nevertheless, a secret oil

drilling mission spearheaded by Lloyd Noble proved to be as pivotal as any battle. Without him, England's energy supplies may have disappeared, potentially changing the course of the war and history.

## Churchill's Secret

Noble was a central figure in the North American oil industry of the 1930s and 40s. A self-made man, he turned a single drilling rig into two global companies (today called Noble Energy and Noble Corporation). His belief in technology revolutionized oil exploration and produced considerable personal wealth, which he used for a variety of philanthropic causes.

"He was exceptionally generous and gave without wanting any fanfare," said Mike Cawley, president and chief executive officer of The Samuel Roberts Noble Foundation, which Noble established in 1945 to assist agricultural producers in the Southern Great Plains. "He was also intensely patriotic. So his spirit of generosity, his knowledge of the oil field and his love for his country set the stage for his contribution to World War II."

Noble's war effort began across the

sea in what historians have called British Prime Minister Winston Churchill's "best kept secret" – one he hid even from his own people. The secret was a sizable oil reserve located in Dukes Wood of Sherwood Forest in Nottinghamshire, England – the same region made famous in the Robin Hood fable. This reserve was critical, considering that by late 1942 Britain was close to surrender because it was running out of oil.

But England lacked proper drilling equipment to extract the oil. More importantly, there weren't enough men available in England at the time, skilled or otherwise, to operate what equipment there was.

Marie Ashby, of the BBC's *Inside Out* news program, told viewers in a February 2007 documentary that the efforts of Noble Drilling Corporation "helped save (England) from surrender."

## Pleading for Help

While the United States' booming oil industry provided Americans with reserves, England was dependent on imported oil, which was being cut off by the enemy. German U-boats hunted oil ▶



tankers and supply ships with ruthless success, leaving the island isolated and with dwindling supplies.

In August 1942, Geoffrey Lloyd, Britain's secretary of petroleum, called an emergency meeting of the Oil Control Board. At the meeting, Phillip Southwell, managing director of England's D'Arcy Exploration Company, pressed his fellow members to fully develop Britain's oil fields. However, the drilling equipment available in England was not suited for the necessary rapid drilling in shallow production fields.

Southwell was so convincing that Churchill dispatched him to Washington, D.C., to plead England's case to the Americans and to return with help.

Southwell ultimately met with representatives from four oil companies. Two contractors from California quickly bowed out, saying they would not be of any use.

Frank Porter, president of Fain-Porter Drilling Company, and Noble remained at the meeting, speaking at length to Southwell, (who still hadn't divulged the location of the oil fields), but finally – reluctantly – said they couldn't help. Porter's company was too small for the task, and Noble had just committed his resources to the Northwest Territories of Canada. Noble excused himself and left for his home in Ardmore, Okla.

Southwell, mindful of England's desperate situation and doggedly persistent, soon followed Noble to Oklahoma. Arriving in Dallas (the closest major airport to Ardmore), he rented a car and was allocated one tank of tightly rationed gasoline. Southwell made the trip on

faith, trusting he would find fuel for the return trip to Dallas.

Southwell arrived in Ardmore in the early morning hours and found his way to Noble's home. According to *The Secret of Sherwood Forest* by Guy Woodward and Grace Steele Woodward, Noble himself answered the door, hair tousled, dressed in pajamas and obviously just out of bed. Noble invited Southwell in as he prepared for the day, and Southwell pleaded his case as Noble shaved, dressed and took business phone calls.

Undeterred, Southwell worked through the interruptions, explaining his dire need, and eventually won Noble to his cause.

Stirred by patriotic fervor, unable to resist the lure of a challenge or perhaps just impressed by Southwell's persistence in chasing him across the country, Noble told Southwell that if Porter would join in, Noble Drilling would commit to the venture. Noble would purchase the necessary equipment for D'Arcy and recruit men to run the rigs. Noble surprised Southwell by telling him he wouldn't expect any profit. The work would be Noble Drilling and Fain-Porter Drilling's contribution to winning the war.

Noble then convinced Porter to join the mission and Southwell left for Dallas – after the famed oilman secured him a tank of gas.

Jim Day, former chairman of the board and chief executive officer of Noble Corporation, has worked closely with the Noble family for 30 years. Day believed Noble's compassion and core values led him to commit his resources. "Lloyd was known as a very unselfish man," Day said. "He saw a country in need,

an ally. It's what you would hope other citizens would do. He wasn't planning on making any money. He had the means to help and stepped up and made a major commitment."

## Putting a Plan Into Action

Next, Noble designated the men to transform the commitment into reality. Gene Rosser was recruited from Wyoming, where he was serving as an assistant in a branch of Noble Drilling, and Don Walker was selected by Porter.

"The choices were well made. He picked Gene Rosser because of his can-do attitude," Day said. "And Don (Walker) was an individual that Lloyd and the people with Fain-Porter selected to keep it organized. Noble never traveled to England to see the Dukes Wood operation. He worked stateside, but he knew how to pick the right men for the project."

Rosser was ordered to Tulsa to see Noble. He was given four days' notice to finish his work, pack his family and head south. He arrived in Ardmore full of curiosity because no one would tell him why he had been so abruptly transferred.

Noble handled that task, asking Rosser how he would like to take four drilling rigs to the British Isles, where he would drill 100 shallow wells, each 2,300 to 2,500 feet deep. It would be a tough job in a war zone under wartime restrictions, Noble explained.

Walker, who would be Rosser's assistant, had lived in Ardmore for years, rubbing elbows with "roughnecks," the common name for oil field workers. While Walker didn't know a "damn thing ►





*(top) Before departing for England aboard the Queen Elizabeth, the American oil field crew paused for a group photo in New York City. One man, Herman Douthit (fourth from the left on the front row), would be tragically killed in a drilling accident and become the only civilian buried in the American Cemetery at Cambridge.*

*(bottom, left) Food was in short supply throughout Britain for the duration of the war. Several members of the American crew lost more than 20 pounds each due to strict government-imposed rations. With the fate of the mission threatened by the unwillingness of hungry oil field roughnecks to continue working, Gene Rosser, project manager, demanded and received extra food for his men.*

*(bottom, right) Although the American oil crew was under strict orders to keep the reason for their presence secret, some locals figured out why they were in the remote region. Here, three roughnecks, (left to right) Pete Oaks, Christ Watson and Joe Barker, enjoy afternoon tea provided by some neighbors appreciative of the workers' contribution to the British war effort.*



in the world about oil,” Noble said he would be the detail man Rosser would need. The pair recruited 44 men – most from Oklahoma and Texas, all in their late teens and early 20s. They were told about the dangers they would face and sworn to secrecy before leaving for New York City.

Shortly after midnight on March 12, 1943, the crew slipped onto the Queen Elizabeth (which had been converted to a troop carrier), packed into 10 rooms as they crossed the Atlantic. The trip was the first of many discomforts. Through the next year, they would work 12-hour days, seven days a week, subjecting themselves to British authority and limited food – conditions which pushed the mission to the brink.

“They were young and ready for adventure,” Day said. “They wanted to be involved in a once-in-a-lifetime project and they were. Their youth served them well, because it was a difficult life.”

### **Roughnecks in England**

Rosser and Walker had gone ahead of the “boys” – as they were called – to coordinate equipment arrival and its transport to Dukes Wood. When the crew arrived in England and boarded a train to Dukes Wood, they were greeted by a large delegation including Rosser, Walker and representatives of D’Arcy, who were anxious to meet the roughnecks.

One Englishman remembered their arrival years later, saying he was impressed by the number of cowboy hats and boots.

Even Walker commented when one of the boys hit the ground with a banjo hanging from a shoulder strap and another arrived carrying a fiddle case. Those musical instruments would serve as reminders of home and help make friends among the British townsfolk during the few hours that the crew had for recreation.

The crew was delivered to Kelham Hall, a working monastery in the small town of Kelham, close to the Dukes Wood field. While the monastery was

still occupied by the monks of the Society of the Sacred Mission, it had also been converted for wartime military use.

Although the roughnecks were there on serious business, they also had opportunities to interact with the townspeople. Doug Wallace, a boy when the adventure began, told the BBC that the Americans had inspired him to be a driller.

While locals were largely kept in the dark about what the boys were doing all day, the roughnecks were undoubtedly American. On their first trip into the nearby town of Newark-on-Trent, the crew put on a fiddle and banjo show that proved to be a hit amongst the townspeople

“You can imagine bringing people from an industry that was rough and ready, like the early American oil field, and putting them into a staid setting like Sherwood Forest,” Day said. “They worked hard and when they did have some time off, they mingled with the locals. I am sure it was quite a sight to behold.”

Lewis Dugger, former resident of New Orleans, was the last surviving member of the crew that worked in England. (He passed away in 2007 in his mid-90s). In one of his final interviews about the Sherwood Forest experience, Dugger recalled the orders they were given before heading into town. “We were just told to keep our mouths shut,” said Dugger, noting that some roughnecks joked that they were making a movie and waiting for John Wayne to arrive. Dugger also said the locals were smart enough not to ask what the men were doing.

Back in Ardmore, Noble also remained quiet. “I don’t think even his children knew what he was doing,” Cawley said.

“He just told them that he’d be away on business more than usual, and he was. Noble traveled across the country to oversee and coordinate the various needs of the project.”

### **Unbelievable Speed**

The American roughnecks quickly got to work and their hosts weren’t quite ready

“It is easy to focus on the oil and adventure, but this was about saving lives and humanity.”

*Jim Day  
Former CEO, Noble Corporation*

for their speed, according to *The Secret of Sherwood Forest*.

Noble crews could complete one well and put it into production each week. Their English counterparts took five to eight weeks. At the end of the first 12-hour shift on a D’Arcy rig, J.W. Nickle, the driller, reported 1,010 feet of hole drilled on his tour – a speed that had never been hit by D’Arcy crews.

A D’Arcy official suggested that Nickle recheck his figure, because it could not be correct. Nickle politely told him that it was correct. A production department supervisor then questioned the report. Nickle again said the report was correct and went back to feeding drill pipe into the hole. A third interruption came from a high ranking D’Arcy manager, who told him the figure couldn’t possibly be true. Nickle, now irritated, introduced the official to a colorful array of American oil field language while assuring him that the figure was indeed accurate and extending him an invitation to take his own measurements.

Rosser intervened and a count of drill stem joints finally convinced D’Arcy officials that Nickle’s tour had indeed hit 1,010 feet. The pace was unimaginable to the English management and drillers.

“Nobody believed they could go that fast,” Day said. “They brought over the





latest and greatest equipment that was available during that era. It was designed to move quicker and set up quicker. Soon the daily drilling reports became routine.”

Noble twice planned on visiting the Sherwood Forest site, but both trips had to be cancelled because of stateside responsibilities. “In my 22 years, this is the first time that I have not been on the scene of operations where some really vital project was underway,” said Noble in a letter to the crew.

The work was hard, even for men used to the grueling pace of the U.S. oil field. Complicating matters was that the same strict food rationing that British civilians faced was applied to the hardworking roughnecks. With no meat available, they primarily ate potatoes and Brussels sprouts, with an occasional egg or apple thrown in. They proclaimed what little beer they could obtain as “soapy water with no alcohol in it.”

Motorman Ray Hileman had packed some seeds, and the boys planted a small garden at the monastery. Hileman was able to supplement the crew’s diet with fresh lettuce, green beans, onions, tomatoes and radishes. Ever industrious, Hileman made trades for a shotgun and began shooting pheasant, breaking England’s poaching laws and triggering an investigation. Hileman ceased his hunting

effort and turned to egg-laying hens, a hive of bees and domesticated rabbits for additional food.

Despite Hileman’s valiant efforts, the situation grew steadily worse. Crews working 12-hour shifts often went without breakfast and several men lost more than 20 pounds each. “We were starving,” Dugger said.

The lack of food was beginning to affect performance, and minor accidents began to occur. Rosser took the situation in hand and went to military officials arguing that his crew was performing a service crucial to the war effort. Further delays and red tape culminated in a loud confrontation with Gen. Robert M. Littlejohn, who was in charge of food services for all British military units. Rosser gave the British leader an ultimatum: more food or they were going home. Extra rations were provided and work continued.

By September 1943, a year after Southwell had been dispatched, the American crew had drilled 64 producing oil wells.

The work continued, complicated by external forces. The crew braved England’s treacherous weather, working in pouring rain with frigid winds from the North Sea.

War restrictions required them to take extra steps like painting each

*(above) While on their secret drilling assignment, the American oil field workers lived at Kelham Hall, a working monastery in Kelham, England. Here, E.F. “Gene” Rosser, manager of the Dukes Wood drilling project, visits with Brother Edgar Riddles, a monk serving with the Society of the Sacred Mission.*

pump jack (called “nodding donkeys” by the English) green to blend in with the surrounding forest. They also used dim lighting to avoid being spotted by German bombers.

Even though war activity swarmed around them, the Americans only experienced one fatality during the trip. Herman Douthit, a derrick man, fell while he was climbing a drilling mast. Douthit was given a hero’s funeral and is the only civilian buried in the American cemetery at Cambridge.

Noble continued to encourage his crew through letters. He wrote: “I am sure that when the record of this project has finally been written, it will not only be a credit to the organization, but it will be one to which you can look back to with a feeling of great satisfaction and pride. You have made a real contribution toward shortening this terrible conflict in which we are now engaged.” ►









## Oil: the Fuel of Victory

More than 100 wells would eventually be drilled, sending more than 2.2 million barrels of high grade crude to British refineries just through the end of 1943. The oil field would continue to produce for an additional 20 years.

With a lifeline established for the English, the Americans returned home at the end of March 1944. According to the BBC documentary, the Dukes Wood oil field proved crucial as its oil was suitable for conversion to high grade aviation fuel, thus giving British pilots a significant advantage over their German counterparts.

Dennis Sheffield, a former Dukes Wood worker, bluntly summarized the vital nature of the project, “It was this country’s salvation. We were on our knees for oil.”

*(opposite) Twin copies of the 7-foot-tall Oil Patch Warrior by Tulsa artist Jay O’Melia stand vigil over Main Street in Ardmore, Okla., and a drilling site in Dukes Wood, England.*

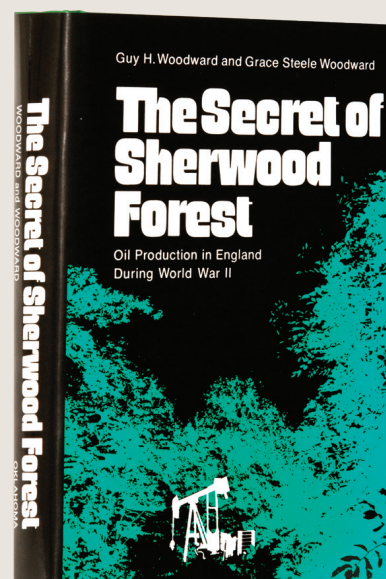
*(above) In 1991, surviving members of the oil crew returned to England for the dedication of the Oil Patch Warrior memorial at Dukes Wood.*

England did not forget those who had so bravely – and quietly – served the country. Southwell was knighted by Queen Elizabeth in 1954.

The Energy Advocates, a Tulsa-based oil and gas advocacy organization, spearheaded an effort to memorialize Noble Drilling Corporation and the roughnecks for their extraordinary valor. With support from a wide range of companies in the energy sector, Noble Drilling Corporation and the roughnecks were honored at the Dukes Wood site with the Oil Patch Warrior, a 7-foot-tall bronze statue bearing the names of the 44 men who were the backbone of the project. A twin monument was dedicated in downtown Ardmore through support of the local community.

Day had the opportunity to hear the crew’s stories in 1991 when Noble Drilling Corporation underwrote a trip for the 15 surviving roughnecks to return to England to dedicate the Dukes Wood memorial.

“When we went over for the dedication, several of the locals knew the Noble personnel,” Day said. “They laughed and talked and told stories. That brought out a real human part of this whole project. It is easy to focus on the oil and adventure, but this was about saving lives and humanity.” ■



The story of Lloyd Noble and the crew at Dukes Wood was chronicled for the first time in *The Secret of Sherwood Forest* written by Guy H. Woodward and Grace Steele Woodward in 1973 and published by the University of Oklahoma Press. Much of the research for this article came from the book.

All historic images in this article are courtesy of Guy Woodward Collection, American Heritage Center, University of Wyoming.



# Jeri Donnell

When Jeri Donnell first heard of the Noble Foundation, it was summer 2005 and the 22-year-old graduate student from Oklahoma State University (OSU) was beginning work on a thesis project for her master's degree in agricultural economics.

Six years later, Donnell has found a permanent home at Noble as more of a teacher than a student. The Wyandotte, Okla., native finalized her master's degree and then became an economics discipline assistant with the consultation team. Soon after, she joined the Noble Foundation's agricultural research team (she also holds a bachelor's degree in animal science from OSU). Today, she serves as an agricultural economics consultant, helping regional farmers and ranchers solve the complex mathematical problems involved in running a successful operation.

As she deciphers her own life's equation, the constant variable has always been her passion for agriculture. No matter what the future holds, the right side of the equal sign will always include agriculture. Below, one of Noble's youngest (and first female) consultants discusses growing up country (including a certain posthole memory), her lack of movie trivia and simple, country dreams.

## What is your favorite childhood memory?

One of my favorite memories was building a barn with my dad. I was about 3 years old. He'd dig each posthole and then use me as the measuring stick to check depth. I was just the right height. He put me in the hole, pulled me out, dug a little more, put me back in the hole and then we'd move on to the next one. We still laugh about that day.

## What was your first job?

My first paid job was working in a retail and wholesale floral business. I grew flowers in containers, tended a greenhouse, planted flowers and mowed a lot of yards. I have a feeling my previous employer would definitely be disappointed in the way I manage my yard.

## Are there any major events that have impacted your life?

When I was younger, my family and I were hurrying to prep a steer for the county fair when the local agriculture teacher jumped in and started helping us. As we backed the calf out of the chute, my dad asked him, "What do we owe you?" He responded by saying, "Don't worry about it. Just make sure she signs up for the ag program when she's old enough." I did and that ag teacher took me to every livestock judging contest I ever wanted to go to. It eventually led to a livestock judging scholarship, which helped pay for college.

## What motivated you to get into agricultural economics?

I've always loved agriculture. I wanted to be a vet from ages 8 to

17, but before I started college I decided I didn't want to work with sick animals every day. I found myself enrolling in college without knowing exactly what I wanted to do. My dad encouraged me to take some business classes so that I would always have something to fall back on. That led me to agricultural economics and the Noble Foundation.

## If you had to describe your work to a stranger on the street, what would you say?

I begin with the big picture story. I work for a nonprofit agricultural research and consulting organization. We take information from the laboratory to the field and eventually to the farmer and rancher where we help them make better management decisions that will improve their operation. It's usually a pretty good conversation starter.

## How does it feel to be Noble's first female consultant?

I honestly don't think about it. More often, I find myself focused on what it takes to be a young, new consultant. Regardless of the gender, I want to be a better consultant so I can improve the lives of the agricultural producers that I help.

## What inspires you?

Learning something new. The world around us is so fascinating. I want to know everything I can.

## What is something people would be surprised to know about you?

I surprise people by my lack of movie knowledge. Don't get me wrong, I'll watch movies every now and then, but not consistently. People are always telling me "Oh, but it's a classic." Still doesn't mean I've seen it.

## So what movie do you like?

*Lonesome Dove*. Greatest movie ever. But, of course, you already know I'm not an expert.

## What's your favorite food?

Thanksgiving dinner is the best, not so much the turkey, but everything that goes with it: mom's homemade noodles, hot rolls, potatoes, casseroles, stuffing and pie – chocolate, coconut cream and pecan. I'm hungry just thinking about it.

## What is your dream?

Sitting on the front porch steps with a good dog and a glass of sweet tea, watching black cattle walk across the green grass with a good fishing pond down the hill. ■

by J. Adam Calaway











# No Limitations

Rob Cook inspires Noble Foundation with tale of tragedy and triumph

by J. Adam Calaway

**T**he helicopter just didn't sound right. Rob Cook had used light-weight helicopters his entire life to herd cattle on his family's 1.25-million-acre ranch – Suplejack Downs Station – Australia's most remote ranch.

The helicopters proved invaluable while moving 10,000 head of cattle through the unforgiving terrain.

But on the bright morning of Sept. 30, 2008, the last muster (roundup) of the season, Cook and his pilot, Zebb Leslie, both knew they were in trouble. When the helicopter reached 200 feet, the engine failed. Their only hope was to aim the helicopter at the ground and hope the updraft from the steep descent would engage the rotors. With the helicopter pointed straight at the ground, the men literally stood on the windshield.

"I thought he was going to do it," said Cook, laughing. But the last ditch effort failed. The men crashed into a densely wooded area almost 50 kilometers from

the family homestead.

Leslie walked away from the crash with barely a scratch. Cook would never walk again.

## Two journeys

Two years later, Cook arrived at the Noble Foundation as part of the Nuffield Australia Farming Scholars. Founded by Lord Nuffield in England, the program spread to former British colonies and neighboring countries (Ireland, Australia, Canada and France). The program helps farmers and ranchers travel to other regions to study agricultural topics to benefit their operations and their native countries.

As part of the scholarship, Cook, his wife, Sarah, their children, Braxton, 5, and Lawson, 3, and two helpful cousins (Luke and Krystle) have traveled around the world including Brazil, Canada, England, France, Mexico, New Zealand, Scotland and the United States.

The globetrotting has been a journey

within a journey. As part of the physical trek, he absorbs as much information about agriculture as possible, looking for techniques and knowledge that he can apply to Suplejack Downs. The other quest is to prove – to himself as much as others – that being a quadriplegic does not mean life is over.

At every stop, with every group of people, he begins by talking about Australian agriculture – "There are two seasons: dry and cold or stinking hot and wet" – the family's operation at Suplejack Downs and ends with the story that altered the former bull rider's life forever.

"This is a story about how I got in this chair," said Cook to a standing-room-only crowd at the Noble Foundation. "But even more it's a story about family and how they have been by me through everything. I'm here because of the support of my wife and family. I want to thank them all for what they've done to help me." ►

*Nuffield Scholar Rob Cook takes a break during his 24-day trek across the Australian Outback. Cook's journey served as an inspiration to other quadriplegics.*



As the story goes, the force of the crash jammed Cook's C4 vertebrae. He wasn't bleeding or bruised. He was just unable to move. "I was completely conscious, and at first I had no pain," Cook said. "I thought my head was jammed, then it felt like two 40-volt charges running down my neck. I felt like I was on fire."

Another problem presented itself. Gas was dripping from the cracked fuel tank about 6 inches from his face. Leslie took what little water they had, doused his shirt and used it to prevent the battery from sparking, then removed it.

After 25 minutes, the other helicopter on the muster found the wreckage. They could not land because of the dense woods so they dropped an axe down to Leslie to cut trees for a landing spot and radioed for help. Doctors arrived at the family's airstrip at Suplejack within a few hours, but could not get to Cook.

The medical personnel and family, including Sarah, a trained nurse, could not drive to the crash site or walk into the area because of the trees. Helicopters provided the only entry means.

Activity continued through the day at the crash site, as people cleaned up debris and cleared trees, but Cook lay right where he had landed.

Throughout the day, there were numerous smaller stories of sacrifice and compassion. A friend flew 620 miles to pick up a paramedic. Cook's dad arrived and used a pocket knife to cut the roof off the helicopter just so the team could get to Cook. Ants crawled all over him, not that he could feel it until one crawled across his eyeball.

And despite all conventional medical wisdom, he kept breathing. "I shouldn't have been able to breathe because it takes muscles to breathe," Cook said. "They don't know how I was able to breathe."

Cook lay at the crash site until 5 p.m. "It was a seven-hour journey, and I did not move a bit," he said. "You certainly learn a lot about yourself in seven hours."

A slightly larger R44 Robinson helicopter was finally able to land so Cook could be airlifted back to the homestead where the Royal Flying Doctors were waiting.

He was then transferred into the medical airplane and flown to Alice Springs (population 26,000, in the Northern Territory and about 450 miles away). Cook was tied to the floor and given medication. It would be the last thing he remembered for three weeks.

## Going on Walkabout

Cook spent the next year living in hospitals, first in Alice Springs, then Adelaide, South Australia, a larger city about 2,500 miles away. His family rallied around him, literally moving down to Adelaide to support him.

Spinal traction yielded no significant improvement, so the spinal surgeons were forced to perform surgery. Cook had no sensation or movement from the shoulders down. The doctor said, "This is as good as you will get."

The family returned to Suplejack Downs Station and bought Cook a big screen TV. He watched movies and sports for a week, then shut the TV off and "decided to get on with my life."

Cook designed a special vehicle for the family to use and a wheelchair lift for a boat so that he could take his boys fishing. He hitched the lawn mower to his motorized wheelchair so he could help with the lawn. He was the architect. His father, brothers and friends were his arms and legs.

The family spent one year on the road traveling around to all the family and friends who had supported them during the extensive hospital stay. And then Cook did something he had told a doctor he would do early in the process. When the doctor questioned the logic of living at Alice Springs, much less the remote family ranch, Cook said, "Not only can I live there, I'll walk to town."

So he did. To raise awareness about quadriplegic issues, Cook "walked" from his home to Alice Springs in his chair. It was early May, the start of winter in Australia, when he began. Along the way he experienced frostbite and he tipped over a few times; however, 24 days later, he reached Alice Springs and in the process inspired others struggling with being a quadriplegic.

"I received a lot of letters and emails from other quadriplegics saying how they had not been living life, and now they were going to try again," he said. "That made it all worth it."

Soon after his trek to Alice Springs, Cook and his family began their worldwide tour as part of his Nuffield scholarship.

## The Future

Two years after being on a ventilator, Rob sat in the Noble Foundation library with Sarah. He talked about how they met (high school friends) and how her dedication inspires him daily. He discussed learning about a lower stress weaning process for calves and radio frequency tags for cattle management from the Noble Foundation consultants. And he talked about the future.

"Before this, we were just trying to figure out how to get on with life and pretend to be happy," he said. "Even though I can't move, I still want to be active."

And active he'll be. Cook's journey will come full circle next year when he returns to the activity that ultimately put him on this path. When he returns home, John Deere has donated a diesel powered Gator, and the company agreed to modify the all-terrain vehicle so he can help muster cattle again. Cook also has been researching how to use herding dogs, which he will command using whistles, to help them move cattle. One way or another, he is determined to contribute to the ranch.

It's the way he wants to live and he hopes to help other injured agricultural producers. Cook has become an advocate, speaking at international conferences on the importance of research and technology that can allow injured farmers to continue contributing to their rural communities. The grand mission is just another part of a future Cook approaches with no fear.

"I would rather attempt something great and fail than do nothing at all and succeed," Cook said. "Everyone has a book to write, and it's up to you to fill up the pages." ■





*Rob Cook and his wife, Sarah, tell the story of the helicopter accident that left him paralyzed. Cook credits his willingness to “get on with my life” to strong family ties and support.*

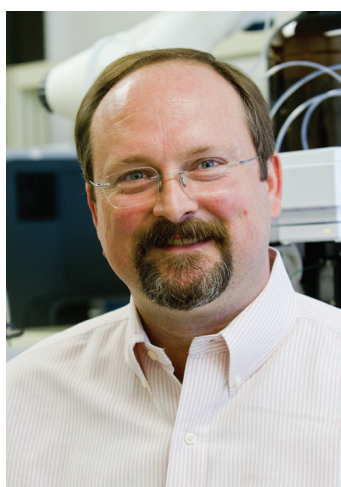


# What discovery will be made in the next decade that nobody believes is possible today?

Scientific achievement often defies human expectations. Each generation's great minds look beyond immediate circumstances, envisioning the answer to an unasked question, making the improbable possible. Along every journey of exploration, the masses doubt and the naysayers mock, but incremental gains and determination ultimately result in breakthroughs that redefine society. Splitting the atom. Curing polio. Walking on the moon. Mapping the human genome.

But what's next? What idea seems absolutely absurd today, but will reshape tomorrow? What field of research will draw together innovation and technology with dedication and imagination to give rise to the next great discovery?

In this edition of the *Legacy* Q&A, Noble Foundation scientific and agricultural staff peer into the future to discuss what unexpected advancement will once again redirect humanity's course.



**Lloyd Sumner**

Professor

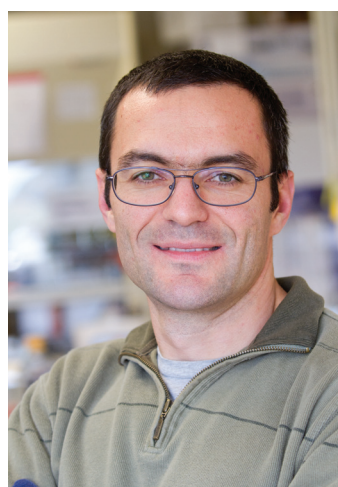
I believe that in the next 10 years there will be major advances in molecular machines. Nanotechnology is now able to produce sophisticated machines such as molecular motors, propellers and switches made out of a small number of molecules. To put these molecular machines into perspective, they are much smaller than a red blood cell. As the sophistication of these molecular machines grows, we will be able to use them to fight diseases. For example, we could conceivably dock a molecular pump that will inject anticancer drugs directly into cancer cells.



**Yanling Wei**

Senior Research Associate

Within the next decade, we will be able to sequence and assemble the genome of any individual of any species in a single day, which will greatly facilitate the study of genetics and its application in agriculture and medicine. Although the human genome project took 10 years to accomplish, it takes no more than 10 days now, thanks to the rapid development of high-throughput sequencing technologies, which people call "Next Generation Sequencing (NGS)," and to the enormous growth in bioinformatics methodologies.



**Igor Kryvoruchko**

Postdoctoral Fellow

Within the next 10 years, we will witness a major breakthrough in the process of converting energy from the sun into hydrogen gas as a renewable energy source. This field reached a dead end purely because of technical reasons. Hydrogen ions are present in many biochemical processes in plants and bacteria. The challenge is to capture those ions with a system stable enough to be scaled up for industrial use and economically sustainable.



**Jim Johnson**

Soils and Crops Consultant

We will see a significant breakthrough in plant breeding during the next decade, specifically the development of a grass that can fix its own nitrogen like legumes. Nobody thinks it is possible today because it hasn't been done yet, but I think it will happen because of the continued advances in plant biology, plant breeding and genetic engineering. The outcome of nitrogen-fixing grasses would be astronomical savings for agricultural producers, who would need less fertilizer to grow grains such as corn, wheat and rice which feed the world.





# Experiencing the Trail

Noble Foundation supports museum's effort to preserve and retell the story of Oklahoma's famed Chisholm Trail

by Patrick McSweeney

The smell of bacon floats through the early morning air. Breakfast on the prairie is quick, and soon the cattle roundup will move on. The wind blows the dust around, making it hard to see. A storm builds and soon raindrops fall from above.

And to think, all this is happening indoors.

The Chisholm Trail Heritage Center in Duncan, Okla., has created a unique learning environment for students and adults alike, welcoming visitors to embrace the experience of the Chisholm Trail. Among the Heritage Center's many interactive exhibits is the Experience Theater where visitors actually smell, see and feel life on the Chisholm Trail.

As a storm rages on the screen, the room's humidity increases and the audience is sprinkled with "rain." On this particular day, as the lightning flashed and thunder clapped around the theater,

a 3-year-old girl in the audience clung to her mother in wide-eyed awe.

Interactive exhibits like the Experience Theater are at the heart of the Chisholm Trail Heritage Center. The museum has been carefully designed to engage the visitor at each stop and is specifically focused on the youth demographic.

Students not only live a day in the life of a cowboy through the Experience Theater, they can practice their lassoing technique on a life-sized longhorn, use equipment that was actually on the Chisholm Trail, interact with famous characters (reenacted by center staff) and experience the Oklahoma Land Run.

"Most museums are not kid friendly," said Darla Carpenter, education program teacher for the Heritage Center. "Our museum has been designed to be an environment that kids can effectively learn in. There are things that they can touch, operate and watch. It is an

*(above) A sculpture, On the Chisholm Trail by Oklahoma artist Paul Moore, greets visitors to the Chisholm Trail Heritage Center in Duncan, Okla. The massive bronze stands more than 34 feet wide and 11 feet tall.*

experience, not just static plaques."

The Noble Foundation's effort to support community education led the organization to contribute \$75,000 to assist with the construction of the Experience Theater and \$163,270 over a six-year period to support the Chisholm Trail Heritage Center's education program.

"The Chisholm Trail Heritage Center plays an important role for the state," said Mary Kate Wilson, director of granting at the Noble Foundation. "Their educational program has won numerous awards and brought history ►



and arts alive for more than 4,000 students just last year.”

“The funding we receive is extremely important to our success,” said Stacy Cramer, executive director of the center. “Opportunities to get out of their communities are limited for many of the students we bring here. The funding we receive helps to get them here and support the overall educational experience we offer.”

The Chisholm Trail Heritage Center provides elementary school teachers a unique way to teach required material to their students. Each lesson at the center corresponds with one of Oklahoma’s Priority Academic Student Skills (PASS) objectives mandated through the Oklahoma Department of Education.

Throughout the year, the Chisholm Trail Heritage Center hosts students from surrounding schools, focusing on reaching students within an 80-mile radius of Duncan. However, schools have come from as far away as Tulsa.

When students visit the Chisholm Trail Heritage Center, they learn more than Oklahoma history.

“As the children go through the center, the staff gets them to think about more than just dates and places,” Cramer said. “Students are encouraged to ask questions. These questions help them gain a better understanding of what happened during the time of the Chisholm Trail.”

With the help of the Chisholm Trail Heritage Center’s teachers, the students also discover how the cowboys accomplished their daily tasks without the use of modern technology. They are forced to



*Sherry Stanley, education instructor with the Chisholm Trail Heritage Center, teaches students from Ardmore Christian School about print making during an art lesson. Each year, more than 4,000 students from southern Oklahoma and the surrounding region visit the center to learn Western heritage, art appreciation and what life was like on the prairie during the late 1800s.*

imagine a time without phones, Internet or cars.

The Chisholm Trail Heritage Center also hosts a large collection of Western art. The center’s board originally feared that the large groups of students might mistreat the art. However, the staff saw this as an opportunity to not only expose students to art, but also teach them about art etiquette.

“The only time you are told not to touch the art is when someone is yelling at you,” Carpenter said. “We not only tell them the proper art etiquette, we tell them why it

exists. The students all leave with a real respect and understanding of the art.”

Duncan has embraced its Chisholm Trail Heritage Center. The trail has long been part of the region’s identity, a key message for the museum.

“Our children are getting so much further away from the agriculture and farming that served as the foundation of our community,” Cramer said. “Our program gives them a better idea of the difficulties it took to settle in the Southern Great Plains. This helps to unite the town behind its heritage.” ■





*(left) In addition to exhibits documenting the history of the famed cattle route, the Chisholm Trail Heritage Center also houses a collection of Western art in its Garis Gallery of the American West. This 3/4 life-sized bronze of Geronimo, the famous Apache warrior, by sculptor Mark Martensen, greets visitors at the entrance to the gallery.*



*(top, right) Alivia Robbins, a third grade student from Ardmore Christian School, tries her hand at rope twirling during a field trip to the Heritage Center. The museum offers a rich mix of traditional museum exhibits, multimedia presentations and hands-on activities for students of all ages.*



*(bottom, right) Among the exhibits at the Heritage Center is this display of native wildlife that early day cowboys would have encountered as they drove cattle on the Chisholm Trail. Other exhibits include a general store, a chuck wagon, Western clothing typical to the end of the 19th century and interactive games.*



## The Gift of Giving

by J. Adam Calaway

As an adult, I have come to know the simple purity behind the old adage “it’s better to give than to receive.” As a kid, well, that was just something I said while making my Christmas list. Many children are fortunate enough to have that one unforgettable Christmas, when anticipation generates insurmountable expectations, which are somehow exceeded.

Mine was 26 years ago. The year was 1985 and the Christmas has been forever branded the “G.I. Joe Christmas” in Calaway lore.

I grew up lower middle class. There was always enough food and clothes, and more love than any child could possibly want, but my parents began saving for the next Christmas as soon as the tree came down. This particular holiday season a windfall swept new opportunities into our household, and my mom and dad aimed to blow Santa’s stocking cap off in gift volume.

My entire list that year was focused on G.I. Joe; not the Godzilla-sized, Ken-doll G.I. Joes, but the handheld warriors of the 1980s. They consumed my every waking hour. They were armed. They had compelling back stories. They even had a slogan (“And knowing is half the battle.”) I just knew one day I would join their fight against Cobra.

That year, I opened my first present and a dozen G.I. Joes spilled out. (There was a tightening in my throat, and I began to blink fast as my mind processed the sheer number.) I opened another package and there was another dozen. (My heart began to race, and my vision blurred.) When the third package revealed a giant, camouflaged tank to hold my new treasures, my overloaded 7-year-old brain could no longer contain the pure bliss. I threw myself into my parents’ arms, giggling.

That morning remains one of the brightest lights on the Christmas tree of my memory.

Today, I think a lot more about giving. The joy I once found in opening presents now resides in that moment of offering. Watching my wife’s face light up from an unexpected gift is the elixir of life. It’s magic.

In recent years, I’ve gained a whole new perspective on giving. Not the giving of Christmas presents, but giving on a grander scale. I work at an organization where the sole purpose is giving – not just of resources, but of effort, time and knowledge.

Our founder, Lloyd Noble, was a famed oilman, but before any other title he was a philanthropist. At the age of 45, he was wealthy beyond imagination. He could have hoarded his money or spent it on extravagant purchases, but instead he looked



at the whole picture of the world around him. Oklahoma, his home state, lay in ruin following the Dust Bowl. Agriculture was all but dead. The region’s economy was blowing away with the topsoil.

Instead of turning a blind eye, he dedicated his resources to the greater good. He established The Samuel Roberts Noble Foundation, naming it after his father because Noble said, “he was the most generous man I have ever met.”

Through the last 66 years, this organization has been dedicated to giving, providing education, and conducting agricultural and plant science research. In the process, we’ve benefited the lives of thousands of individuals. It’s not magic; it’s the result of dedication, skill and sacrifice. And the vision came from one man, who made a decision to give. Noble said, “The obligation that rests squarely on the shoulders of each generation is not what they inherit, what they have handed to them or what they acquire from the standpoint of wealth or position, but what they do with the wealth or power that they have in their hands.”

You cannot be immersed in this environment, surrounded by passion and purpose, and not ask: How can I give back?

We live in a world of need, where problems seem all consuming. Our offering may be smaller than Noble’s, but it is no less vital. Every charitable act, every gift combines to stem the tide of apathy and troubles that threaten to overwhelm us. Without giving, we’re lost. With it, we find our humanity and happiness. Like English Prime Minister Winston Churchill once said, “We make a living by what we get, but we make a life by what we give.”

So give. Give freely and completely. Be someone’s Christmas morning dream. Because, in the end, it truly is better to give than to receive, and knowing that is half the battle. Happy Holidays. ■





*(above) Richard Bates, Ph.D., Noble Foundation researcher from 1955 to 1993, examines a research plot of small grains. Dr. Bates assumed leadership of the Agricultural Division's grain breeding program after Roy Chessmore, Ph.D., left the Noble Foundation in 1965. During Bates' tenure, the rye varieties Maton (1975) and Oklon (1993) were released by the institution. A third rye variety developed by Dr. Bates was released*

*posthumously in 1994 and named Bates rye in his honor.*

*In addition, Bates launched small grains trials in 1966 to compare the productivity of different grain varieties. Those trials continue to the present time (see story beginning on page 8). Today, the legacy of pioneers like Bates is carried on through the plant breeding and improvement research conducted by the Agricultural, Plant Biology and Forage Improvement divisions.*





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*(below) An Angus steer stands before vibrant fall colors at the Oswalt Road Ranch in Love County, Okla. The ranch is one of the Noble Foundation's seven farms where agricultural research is conducted.*

