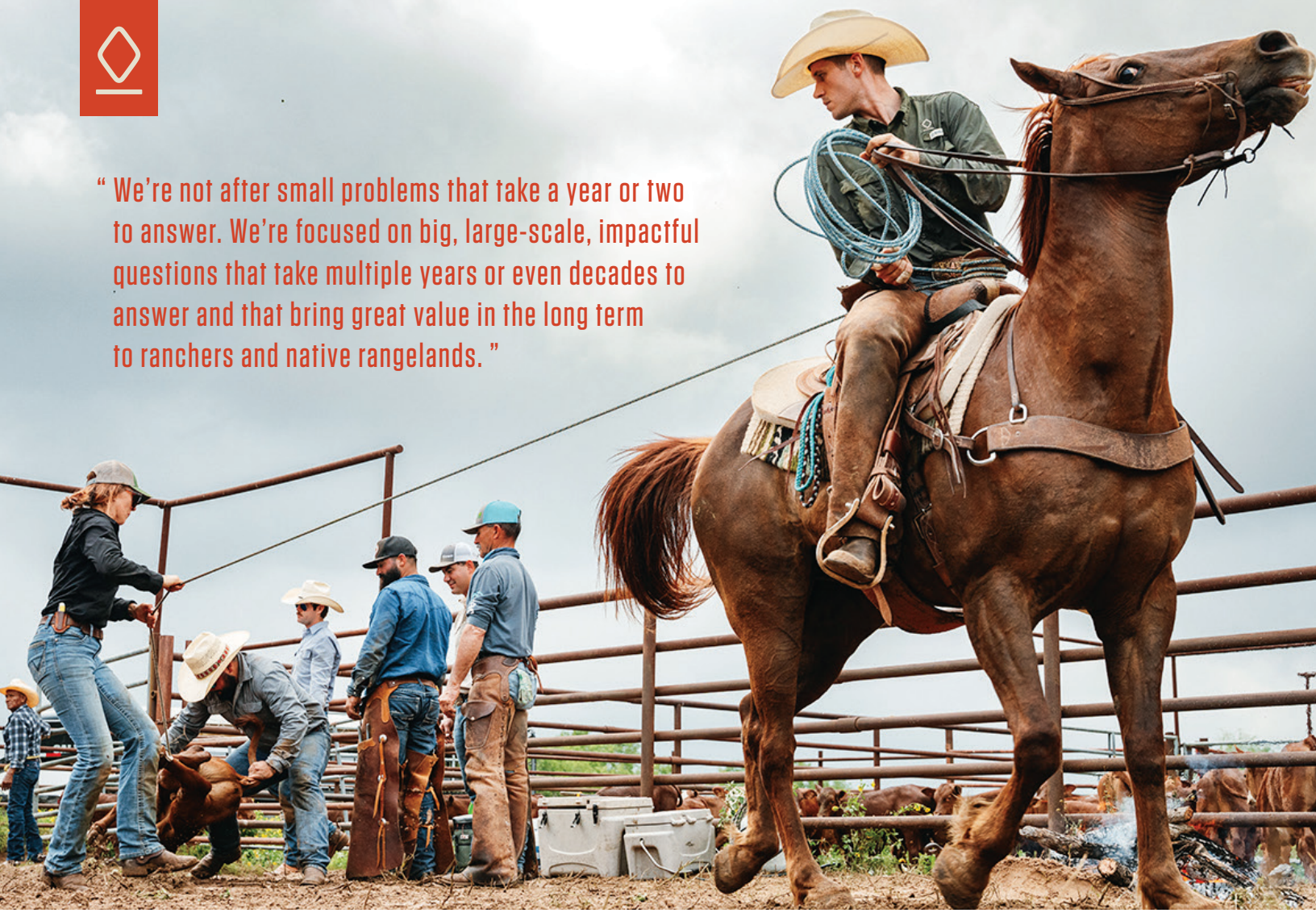

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SCIENCE WITH ITS BOOTS ON THE GROUND

Science is the Bedrock of East Foundation's Mission

By Burt Rutherford

It's easy to assume, given an outfit whose reputation is so firmly rooted in science as East Foundation, that crystal balls aren't part of the planning process. But that doesn't mean that the people both inside and outside the organization don't have the future firmly in mind.

"We want to anticipate those issues that would present the biggest challenges or greatest opportunities for native rangelands and their managers in Texas and elsewhere. Then, we focus on developing science-based answers to help ranchers and other land stewards solve the problems we're going to face in the future with better decision making."

In a nutshell, that's how East Foundation President & CEO Neal Wilkins describes what they're about. And science will get them there.

"We're not after small problems that take a year or two to answer. We're focused on big, large-scale, impactful questions that take multiple years or even decades to answer and that bring great value in the long term to ranchers and native rangelands," he adds.

Easy, right?

"Well, we do work in a harsh environment," Wilkins admits of the 217,000 acres of South Texas rangeland where the Foundation's ranches are that all but guarantees a significant set of challenges when doing research on a large scale in a harsh environment. "But if you can prove things work in a harsh environment, you can often make them work in a more moderate environment."

East Foundation, a respected but relative newcomer to the scientific research scene, carries out that mission in three different areas—livestock production, wildlife conservation, and range science, with rangeland tying everything together. After all, you can't have efficient livestock production and healthy wildlife populations without a healthy landscape.

SCIENCE ON THE RANGE

To that end, East Foundation is conducting large-scale and long-term range science research that's already been underway for longer than many similar trials, according to Dr. Andrea Montalvo, who leads the research from her location in Hebbronville.

She's been studying the impacts of different grazing applications on bobwhite quail for around 10 years. The research is unique, given the nature of the South Texas landscape. "There have been a lot of grazing studies all over the country, particularly in Texas, but few that replicate real-world scenarios, in our opinion," she says (See sidebar).

Another research trial goes to the heart of the Foundation's ranching business. Foundation staff have been on a long-term herd improvement effort to produce the ideal South Texas cow. Enter the genomics project.

Genomics is the process of sequencing the DNA of an individual animal, identifying the genetic potential that animal possesses, and then including that in an EPD, or expected progeny difference estimate, for greater genetic accuracy.

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"My view is that most of the efforts to incorporate genomics into cattle breeding have been on the seedstock side," according to Dr. Jason Sawyer, Chief Science Officer for East Foundation. "For commercial producers, it is difficult to feel you can get any direct value from genomics," he adds, "other than buying bulls that have genomically enhanced EPDs."

So, Sawyer and his team developed an approach where they can get genomic information on every cow, use that to make better decisions in their herd improvement program, and turn it into a research project at the same time.

They reached out to Dr. David Riley, a geneticist at Texas A&M University (TAMU), to join the project. He not only collaborates with Sawyer and his team on their genomics program, but he also uses that data in his own research.

"We are going to use the East Foundation herd as a discovery and validation herd for what we're doing in our own research herds," he says. "We want to use genomics in combination with what we know about hybrid vigor with Bos indicus (Brahman-based) crosses."

Some degree of Brahman influence is essential in East Foundation's crossbred cattle. But how much is enough? That's one of the data points that Sawyer seeks as they work toward an ideal South Texas cow. "This is one way that we envision direct use of genomic information," says Sawyer. "Pedigree based estimates of breed composition are not always accurate, and we want to know not just what percentage Brahman is ideal, but where in the genome it is most valuable."

“ We don’t pretend that our results apply everywhere. You can’t take our research outcomes in South Texas and apply them directly to Nebraska. But we can certainly apply them to tens of millions of acres in Texas, and in the process, train scientists who can then ask the same kinds of questions in a different environment.”

Crossbred cattle have hybrid vigor or heterosis, which is the genetic boost from crossing a cow and a bull of different breeds. By its nature, it creates cattle with more robust DNA, referred to as heterozygosity.

“The thing I really want to know is how does heterosis correspond to genuine heterozygosity in the genome,” Riley explains. “We try to draw conclusions from our own research, and we will check those by doing similar things in (the Foundation’s) work.”

Reproductive traits are the most important traits in beef production, Riley says. Indeed, you can’t sell a calf that’s never born. But they’re hard to improve through genetics because they aren’t very heritable. However, reproductive traits are responsive to heterosis.

"So, some of the things we want to do is look at the regions of the genome and heterozygosity and compare that to heterosis," he says.

The long-term goal? "(If) we could make an animal where they're heterozygous in all the right places, that would result in really high performance for reproduction."

WIN-WIN COOPERATION

Indeed, collaborating with scientists at Texas A&M University and Texas A&M University-Kingsville only strengthens the East Foundation's science program as well as its outreach.

"A lot of questions come up that other people may not have the ability to study," Montalvo says, because universities are often limited by their funding. But when scientists from TAMU and TAMU-Kingsville cooperate on research with East Foundation scientists, everyone wins.

Cooperative research projects with East Foundation have a lot of advantages, according to Dr. David Hewitt, executive director of the Caesar Kleberg Wildlife Research Institute (CKWRI) at TAMU-Kingsville.

"One is to do the types of science (involved with) long-term research projects that can answer questions in this highly variable environment. That's a huge advantage because those kinds of research projects are really difficult, first, to get funded, and secondly, to have places to do them over the long term and at large scale," Hewitt says. "One other big reason is the strategic vision that East Foundation has and how science can fulfill it," he adds. "The grazing projects, the ocelot conservation work that the Foundation is doing, science is a big part of those. So being able to bring our expertise and our scientists to those efforts that have bigger strategic value has been very rewarding."

It doesn't stop there. The partnerships the Foundation and university partners forge not only bring additional science brains to the research, but they also provide fertile ground for master's and Ph.D. students. While the focus of all the research conducted on Foundation ranches is long term, learning comes one data set at a time.

"Most master's and Ph.D. students design a study and produce results within two to three years, and then get out papers," Montalvo says. "That's a good thing for us because any short-term progress we make, we can usually get it published and out into the world for other land managers to learn from."

In addition to published research, working with graduate students enhances the education aspect of East Foundation's mission in other ways.

Glossary of Terms

Genomics: the process of sequencing the DNA of an animal and using this information to predict the genetic production potential of that animal.

EPD: acronym for Expected Progeny Difference estimate. An EPD expresses the relative breeding value of a parent, and its accuracy can be enhanced with results from DNA sequencing.

Heterosis: hybrid vigor, or heterosis, is the production boost from crossing a cow and a bull of different breeds, where the potential of the calf exceeds the average of the parents.

Heterozygosity: the degree of difference among the two versions of each gene in DNA inherited from parents or ancestors. The more different the genes of the parents are, the more heterozygosity is expected in the progeny.

New World Screwworms (NWS): New World screwworm flies *(Cochliomyia hominivorax)* are a devastating pest. NWS fly larvae (maggots) burrow into the flesh of a living animal and cause serious, often deadly damage. NWS can infest livestock, pets, wildlife, occasionally birds, and in rare cases, people.

Cattle Fever Ticks: Cattle fever ticks *(Rhipicephalus (Boophilus) annulatus* and *R. (B.) microplus)* are important cattle ectoparasites in the United States. These ticks have been a threat to American agriculture for generations because they can spread the often fatal disease bovine babesiosis, commonly called cattle fever.

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"We don't pretend that our results apply everywhere," Wilkins says. "You can't take our research outcomes in South Texas and apply them directly to Nebraska. But we can certainly apply them to tens of millions of acres in Texas and in the process, train scientists who can then ask the same kinds of questions in a different environment."

To that end, East Foundation recruits the best and brightest upcoming scientists from across the country.

"Then we bring them to South Texas, train them here, and work with them to make sure that they end up in positions of importance and influence elsewhere in the country."

So far, East Foundation has trained scientists from around 20 different states and has helped them get placed in positions in states like Maine, Oregon, Virginia, and Florida, as well as Texas.

BOOTS ON THE GROUND

"As a science program, we see our purpose as enhancing decision-making capability for land stewards," adds Sawyer. "That's why we exist as a science program, so every project that we think about then needs to be in that context. Can it fulfill that purpose?"

However, while East Foundation is a science-based organization, it's also a working cattle ranch. "It's important that we deploy all these research questions in the context of our ranching enterprise or our wildlife management," he says. "And the benefit of that is we're measuring how things actually work in a realistic setting."

That's where the intersection of science and running an efficient ranch come to a mutually beneficial confluence.

"It's increasingly obvious to us that the next decade in ranch management—livestock management and wildlife management—we're going to have more wildlife and livestock disease interaction," Wilkins says.

Think of current issues like New World Screwworms and cattle fever ticks, for starters.

"So, we try to look around the corner and not just go for whatever the hot topic is at any one moment but anticipate what those hot topics are going to be," Wilkins says. "We're not always right because you can't see the future, but that's our role—take those risks and anticipate what those hot topics are going to be so that we're helpful in leading the development of solutions. Just in time, not too late.

Quail in the Crosshairs

According to Dr. Andrea Montalvo, who heads one of the largest landscape research trials under the East Foundation umbrella, it's common practice for a South Texas rancher (or one anywhere else, for that matter) to look at a pasture and say, "Well, it looks like it'll run a pair to 35 acres."

And they will hold it there indefinitely, inflexible to change, Montalvo says. That may be okay in an area where it rains a little more consistently. But the South Texas drought in 2017 showed clearly what happens to the inflexible.

"Our (percentage of) bare ground skyrocketed, our biomass declined, our bobwhite population declined. And we had to make a decision to destock."

The trial is now looking at how adaptive grazing treatments interact with bobwhite quail and other wildlife. "Our stocking rates fluctuate every fall," she explains. "We measure biomass in every pasture, and we stock cattle based on the standing crop of grass and preferred forbs."

Two different stocking rates are applied based on target forage removal by cattle—25 percent, which is the typical 'take half, leave half' rate that considers both grazing and forage that disappears from trampling and other losses, and a more conservative 12.5 percent harvest target (half as much grazing removal as the 25 percent treatment).

"We have the advantages of time and size, and we're trying to capture fluctuations in grass growth, forb growth," she adds.

While Montalvo's research is focused on livestock and quail, the trial offers other research scientists an opportunity to look at other wildlife, game species, and non-game wildlife alike.

As such, other research is focused on white-tailed deer, she says. "We also look at grazing effects on small mammal and bird populations on those pastures. So pretty much anything that can happen, we try to monitor that change through time and at large scale."