Grazing Management: A Key to Beef Sustainability

Coordinators: Dr. Jacquelyn Prestigaard
Dr. Jeff Goodwin

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Grazing Management: A Key to Beef Sustainability

Texas A&M Beef Cattle Short Course

MEET THE SPEAKERS

JEFF GOODWIN, PHD

Director, Center for Grazinglands and Ranch Management and Research Assistant Professor

Jeff previously worked with the USDA NRCS as a state rangeland management specialist in Texas. In 2014, he received the agency's national Rangeland Conservationist of the Year Award. He also worked at Noble Research Institute as conservation stewardship lead and senior rangeland and pasture consultant. He has presented extensively across the nation on ecosystem services, soil health and carbon sequestration on grazing lands, prescribed fire and managing grazing land systems. His research interests include the economic and ecological impacts of grazing strategies, sustainable grazing management and ecosystem services.

HUGH ALJOE

Director of Ranches, Outreach and Partnerships, Noble Research Institute

Hugh provides oversight to consultation and education programs for producers in the Southern Great Plains. He is also a pasture and range consultant. Before coming to the Noble Research Institute in 1995, Aljoe was the ranch manager of Belvedere Land & Cattle Corp. for 10 years. He supervised the growth of the ranch from a small 450-acre, 150-head purebred ranch into an extensive 3,900-acre, 1,500-head purebred and commercial cow-calf operation. Forage resources were predominantly introduced bermudagrass pastures (overseeded to ryegrass) that were managed using adaptive multi-paddock grazing.

BILLY COOK, PHD

Vice President of Producer Relations, Enriched Ag

As Enriched Ag's VP of Producer Relations, Billy engages with cattle producers across the U.S. assisting them in achieving their production, stewardship, economic and quality of life goals. His past research efforts focused on increasing beef cattle production efficiency, advanced grazing systems and benefits of sound land stewardship efforts. He was previously the Senior Vice President and Director of the Agricultural Division at the Noble Foundation where he was responsible for producer consultation, the applied agricultural research program, as well as producer and youth education efforts.

JACQUELYN PRESTEGAARD, PHD

Livestock Sustainability Specialist and Assistant Professor, Texas A&M AgriLife Extension

Jacquelyn grew up on a beef cow/calf operation in Northern Illinois. She began working with AgriLife in January 2023. She develops Extension educational programs to increase scientific literacy of livestock and environmental stewardship in Texas and across the US. In her graduate research, she sought to model the ideal balance between economic feasibility and environmental stewardship for beef and dairy producers. She also worked postdoctorally at Select Sires, Inc. to model individual intake of lactating dairy cattle using ear activity monitors with the goal of improving genomic selection of animals with desirable residual feed intake.

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SUSTAINABLE GRAZING PANEL

MYRIAH JOHNSON, PHD

Vice President, Corporate Sustainability, Farm Credit Services America/Frontier Farm Credit

Myriah grew up on a cattle, wheat and soybean farm in Oklahoma and remains involved in the family operation. She started her career as an ag economics consultant at the Noble Research Institute, and later piloted sustainability programs. She also served as Senior Director of Sustainability Research at NCBA, leading the Beef Checkoff research program, as well as the Executive Director of Sustainability at BrdgAI (now Enriched Ag), a carbon startup. She currently serves as co-chair of the Goals & Progress Working Group for the U.S. Roundtable for Sustainable Beef.

CHAD ELLIS

CEO, Texas Agricultural Land Trust and Chair, US Roundtable for Sustainable Beef

Chad has over 25 years of experience working directly with producers and land managers implementing stewardship focused management. Ellis not only promotes and advocates land stewardship principles, he also implements it within his own family operation in Lohn, Texas. Mr. Ellis is passionate about helping empower the producer to be better tomorrow than they are today. Ellis brings deep connections and experience as chair to US Roundtable for Sustainable Beef, chairman for Ecosystem Service Market Consortium, and the founding chair of Trust in Food's Trust in Beef program.

BOB MCCAN

Owner and Operator, McFaddin Enterprises

Bob oversees the cattle operations and recreational hunting and wildlife operations for his family's ranches in Victoria, Refugio, and Bee Counties. He was elected TSCRA president in 2003. During his tenure, TSCRA received an award along with Texas Beef Council and Texas A&M Extension Service on creating the Texas BQA training program. In 1995, Gov. George Bush appointed McCan to serve on the Fire Ant Research and Management Account Advisory Committee. Since 1993, McCan served on the National Cattleman's Beef Association board. From 2005 through 2008, he served as a regional vice president for NCBA and served on the Executive Committee.

JASON SAWYER, PHD

Chief Science Officer, The East Foundation

Jason has over 20 years of experience in applied research and management, where he has led and coordinated applied research in livestock production systems in both intensive and extensive settings. Previously, Jason served as Associate Professor at the King Ranch® Institute for Ranch Management, where he worked to develop innovative solutions in ranching systems. He has also served in research, teaching, and management roles at TAMU's Department of Animal Science, and in research and extension roles at New Mexico State University's Clayton Livestock Research Center.

Fact Sheet: Tough Questions about Beef Sustainability

Project Title: How Does Carbon Sequestration Affect the Sustainability of Beef?

Principle Investigator(s): Ashley Broocks, Emily Andreini, Sara Place and Megan Rolf

Institution(s): Oklahoma State University

Carbon is one of the most common elements on earth and is essential for life. Carbon sequestration refers to the long-term capture and storage of carbon from the atmosphere (typically carbon dioxide, CO_2). Enhancing biological carbon sequestration in soil and plants is a promising method of reducing greenhouse gas (GHG) emissions and combating climate change. Anthropogenic or human activities such as burning fossil fuels and land use changes (e.g., deforestation, and the tillage of native grasslands for crop production) have led to an increase in atmospheric concentrations of carbon dioxide (a GHG) since the beginning of the industrial revolution. Carbon dioxide atmospheric concentrations have risen from their pre-industrial level of 280 parts per million (ppm) to over 400 ppm today.[1] The increase in concentrations of carbon dioxide and other GHGs in the atmosphere has contributed to global climate change and variability.

The carbon cycle (Figure 1), like any other naturally occurring process, involves a cyclical recycling, storage, and use of a resource in different states. Carbon reservoirs, where carbon is stored, include oceans, soil, and vegetation. Plants take in sunlight and carbon dioxide to synthesize carbon-containing sugars and other carbohydrates during photosynthesis. Plants, animals (including humans), and soil microbes consume molecules containing carbon for energy and release some of the carbon back into the atmosphere in the form of carbon dioxide during the process of aerobic respiration. Organic carbon from animal waste and decaying plants is stored in the soil.

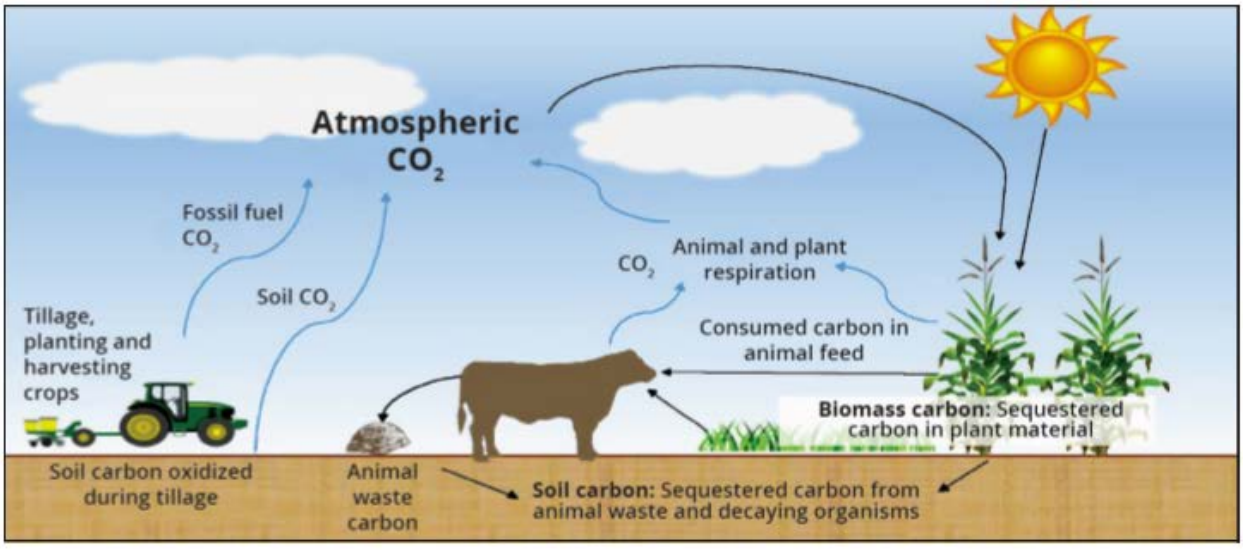

Figure 1. Carbon cycle demonstrating both additions to and removal of atmospheric carbon dioxide (CO_2) *Clip art courtesy of www.openclipart.org.*

Whenever soil is disturbed and exposed to the air, it releases stored carbon back into the atmosphere. Carbon is also released into the atmosphere from anthropogenic activities, such as burning fossil fuels (which are themselves reservoirs of carbon).

Many different agricultural production practices exist that can capitalize on carbon sequestration in both soil and biomass to reduce environmental impact. The goal of these methods is to modify current production practices in a way that enables the use of the natural carbon cycle to replenish carbon stores while reducing the amount of carbon in the atmosphere.[1] Restorative agricultural production practices have the potential to decrease atmospheric carbon and reverse some of the effects of climate change.[1,2] One example of a restorative practice is "no-till" crop production, where farmers do not turn over or till the soil (commonly done to reduce weed growth) in preparation for planting the next round of crops.[3] Some "no-till" cropping systems also incorporate cover crops, which involves planting a secondary crop that will not be harvested (such as turnips), but can be utilized for grazing beef cattle, controlling weed growth, reducing erosion, and enhancing soil organic matter.[2]

Beef cattle production can play an important role in furthering carbon sequestration by producing a nutritious food product for humans by utilizing grasslands that can store a large amount of carbon. Globally, if soil organic carbon in agricultural lands and grasslands could be increased 10% over the course of the 21st century, carbon dioxide concentrations in the atmosphere could be reduced by 110 ppm.[1] Grazing cattle and other ruminants on pasture and grasslands can preserve untilled land and reduce soil erosion (another environmental benefit) while producing human food and other products (e.g., leather).[2]

In the United States, pasture and grasslands represent 27% of the land area,[4] thus preventing this land being converted to tilled cropland and residential uses which further increase GHG concentrations. Additionally, establishing permanent pastures for grazing beef cattle on degraded croplands (lands that are currently tilled, but are of poor quality) can sequester carbon at rates comparable to forests.[2] Most beef cattle in the United States spend the majority of their lives on pastures and grasslands. For beef cattle finished in a feedlot, approximately 65-85% of their life will be spent grazing, and, for grass-finished beef cattle and beef cows, up to 100% of their life may be spent grazing. As a consequence, regardless of the beef production system, enhancing carbon sequestration through well-managed beef cattle grazing systems and improved feed production practices (e.g., no-till systems, using cover crops) can reduce the carbon footprint of beef and contribute to the reversal of global climate change.

Bottom line: Carbon sequestration is the long-term storage of carbon from the atmosphere in soil and plants. There are many different techniques to achieve carbon sequestration, including reducing tillage of soil and establishing permanent grasslands. Beef cattle play an important role in increasing carbon sequestration through the production of human food from untilled pastures and grasslands, and the integration of cattle grazing into "no-till" cropping systems.

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2. Council for Agricultural Science and Technology (CAST). 2011. Carbon sequestration and greenhouse gas fluxes in agriculture: challenges and opportunities. Task Force Report No.142.

3. Aziz, I., T. Mahmood, and K.R. Islam. 2013. Effect of long-term no-till and conventional tillage practices on soil quality. Soil Till. Res. 131: 28-35.

4. Nickerson, C., R. Ebel, A. Borchers, and F. Carriazo. 2011. Major uses of land in the United States, 2007. Economic Information Bulletin Number 69. USDA/ERS, Washington, DC

Harnessing Data-Driven Technologies for Grazingland Sustainability

Billy Cook
VP, Producer Relations

Texas A&M Beef Cattle Shortcourse
August 7, 2023

Enriched Ag

Enriched Ag Team

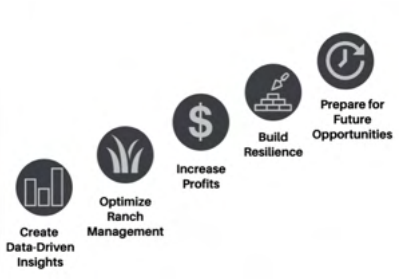
Technical:

Machine learning, distributed systems, computer vision, big data; Experience at Yahoo, Intel, Google, Uber, Apple, Carnegie Mellon University

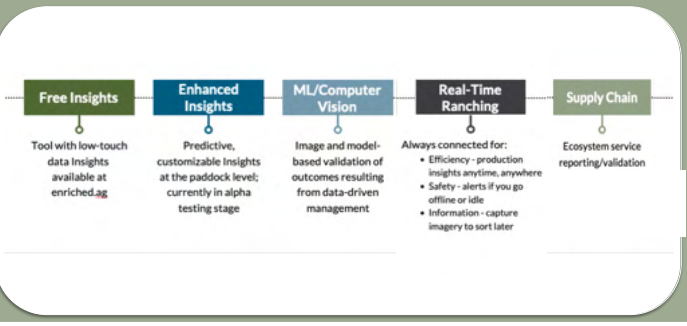
Ranching:

Extensive knowledge of ranching space; Decades of creating beneficial relationships with ranchers

Enriched Ag's Strategy



Enriched Ag Products



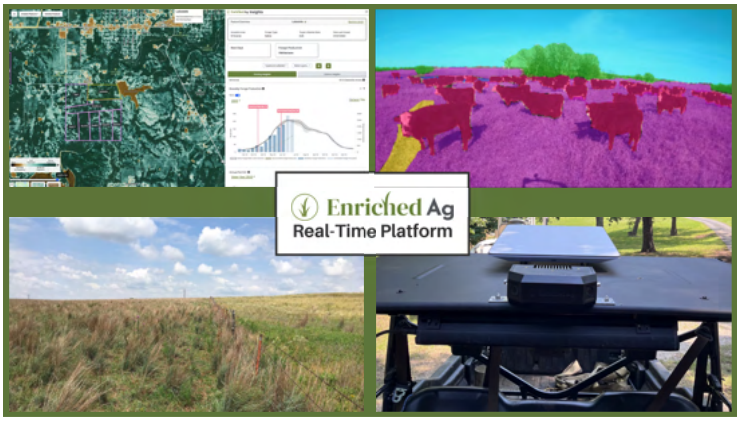
Ranching Insights Tool

- Low touch
- Pasture level data/insights
- Predicted forage production (15, 30 & 60 days)
- Localized critical decision dates
- Species, herd & class capable

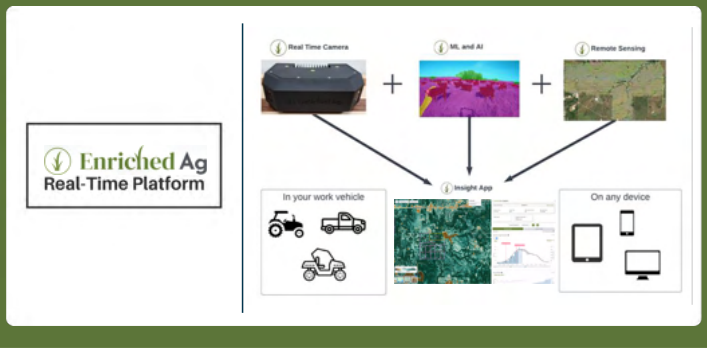
"…..this tool makes grazing management easier and *almost* enjoyable."

Our Producer Network

- 32 Ranchers as Alpha Testers of Ranching Insights Tool
- 14 states
- 850,000+ acres



How It Works



Enriched Ag Real-Time Hardware/ Software

Hardware:

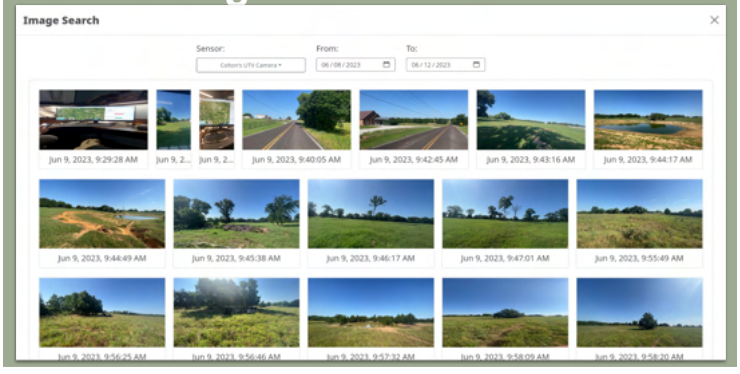
- Starlink System
- Real-Time Camera
- Dedicated Tablet

Software:

- Insight Map
- Real-Time ML/AI enabled Software
- Mobile Photo App

Post-Drive Image Exploration

Image Search Feature



Data for Ranch Operations

Pasture
- Forage Height Estimation

Cattle
- Real-Time Classification

Enriched Ag

More Ranch Data = More Insights

ANIMAL	MANAGEMENT	FORAGE
Identification/inventory Activity Disease detection Well-being	Security Fence integrity Water availability Safety!!	Quantity/quality Invasive species Bare ground

Enriched Insights Engines

Enriched Ag Forage Growth Engine	Enriched Ag Cattle Analysis Engine	Enriched Ag Plant ID Engine	Enriched Ag Aesthetic Image Engine
Remote sensing of forage biomass harmonized with weather data, historic production, and on-the-ground measurements	Image segmentation framework to identify cattle and label interesting characteristics - health/well being	Framework to identify plant species from remote sensing and ground photography (invasive vs. native)	Identify aesthetic images across ranch operations to support marketing, branding and other value-add initiatives

Enriched Ag Strategy

Create Data-Driven Insights

Optimize Ranch Management

Increase Profits

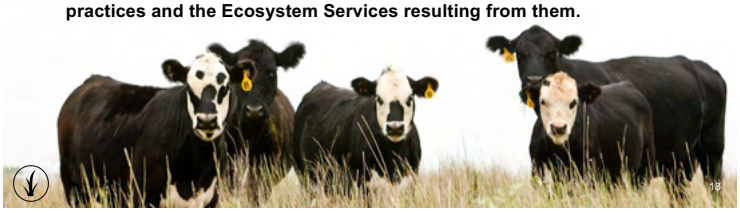
Build Resilience

Prepare for Future Opportunities

Prepare for Future Opportunities

Enriched Ag's Goal is for this platform to:

- **Inform insight-based management decisions at the ranch level**
- **Become the means to Verify, Validate and ultimately Value management practices and the Ecosystem Services resulting from them.**



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twitter.com/enriched_ag

BEEF. IT'S WHAT'S FOR DINNER.®

BEEF SUSTAINABILITY: FACT VS. MYTH

	FACT	MYTH
	■ Beef production, including the production of animal feed, is **responsible for only 3.7% of greenhouse gas emissions** in the United States.	■ Cattle are one of the leading sources of greenhouse gas emissions.
	■ Cattle **only consume 2.6 lbs. of grain per pound of beef,** which is similar to pork and poultry, and nearly **90% of grain-finished cattle feed is inedible by humans.**	■ Cattle consume 9 pounds of grain or more per pound of beef and compete with people for food.
	■ Corn going to feed beef cattle represents **only 10% of harvested corn grain in the United States,** or 8 million acres.	■ We grow 100 million acres of corn just to feed cattle.
	■ It only takes 308 gallons of water to produce a pound of boneless beef, and water use by beef is around **5% of U.S. water withdrawals. Plus, this water is recycled.**	■ It takes up to 24,000 gallons of water to produce a pound of boneless beef and beef is major drain on water resources.

CA Rotz, S Asem-Hiablie, S Place, G Thoma., 2018. Environmental footprints of beef cattle production in the United States. Agricultural Systems. Advance online publication. doi.org/10.1016/j.agsy.2018.11.005.

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Profit Over Pretty

Regenerative pastures may not be conventionally attractive, but there's more than meets the eye.

Estimated read time: 4 minutes

On one side of the lightly traveled state highway — behind the pipe fence — is a manicured pasture. Cattle continually graze the weed-free Bermudagrass. Just over the hill stands a barn filled with hay that was recently baled and put up.

However, across the road, things look different.

The cattle and goats that were seen grazing last week are no longer there.

Forbs are present.

Hay goes uncut.

While the fields may look overgrown, even "weedy," this place is not only well-managed, but boasts a healthier ecosystem and stronger bottom line than other cow-calf operations.

And that's the thing about ranches that focus on applying soil health principles — they may not look as pretty, but you can't judge a book by its cover.

Since Noble Research Institute made the switch to regeneratively managing ranches in southern Oklahoma in 2020, the staff have heard many of the same comments other regenerative ranchers hear.

What's happening over there?

Do you still run cattle? Where are they?

Neither Hugh Aljoe, director of producer relations, nor Jim Johnson, senior ag consultant, mind the chatter. It gives them a chance to explain just what they're getting out of those pastures that some may call ugly.

"We're doing things differently than we have in the past, so things are going to look different," Aljoe says.

The timing for the change couldn't be better, Johnson says, due to the drought facing much of the southern Great Plains and western states. Implementing soil health principles has greatly reduced the amount of inputs used on Noble Ranches — not that the inputs would have done much good during this sizzling summer, anyway.

"In a regenerative operation, you're going to save money on fertilizer and weed spray — that's one of the biggest advantages," he explains.

He says that's just one of the upsides of ranching with a regenerative mindset.

"We're looking at maximizing what nature can provide for free," Johnson says. "If we work with the environment instead of against it, what can we save? What can we gain?"

The benefits, according to Aljoe, are incredible. And even though they may run fewer cattle at certain times during the year, they've found they can make more money on the same amount of land.

He recognizes some may be skeptical, though. And he gets it. People aren't used to seeing weeds and other plants in these pastures — but it's intentional.

"We want to see what's out there," Aljoe says. "And we want to see what the animals are going to do with those plants given the opportunity."

While Noble Research Institute's ranch staff is focusing on increasing soil health and building a stronger bottom line, they are also collecting the data and experience necessary to share the methodology with ranchers all over the country who want to employ the principles on their own places.

They're already sharing their stories in the free, weekly digital newsletter, *Noble Rancher*. And later this year, the institute will announce educational opportunities.

"We're tracking everything on each of our ranches, so we'll be able to refer to what changes we've observed, not only from the land itself, but also the livestock production, the economics, and rancher well-being," Aljoe says. "It's exciting because this is a whole different type of management where producers end up with a lot more time to focus on the things that can make money as opposed to practices that cost them money."

And that is truly a thing of beauty.

PHOTOS