

Noble's Research Strategy

Science-Based Approach to Help Farmers and Ranchers



Overview

This document is a strategic roadmap to guide and inform Noble's research trajectory over the next 5 years (2025-2030). Our goal is to identify research priorities that advance Noble's mission to revitalize U.S. grazing lands while supporting producers to sustain their livelihoods and remain on the land. To achieve this goal, Noble is committed to leveraging science to produce and share unbiased, reliable information that addresses both current and emerging challenges faced by U.S. livestock producers. Our approach is simple: **apply science to develop solutions that promote the conservation of our grazing lands and enhance the well-being and quality of life of rural communities.**

At the core of this effort is our commitment to collecting, analyzing and disseminating robust, scientifically rigorous data. We are deeply committed to the scientific process to distinguish and position Noble at the forefront of innovation, conservation, agricultural production and rural prosperity. This commitment is deeply rooted in the vision of our founder, Lloyd Noble, whose guiding principle was to safeguard the soil and support producers in advancing sustainable land stewardship practices. Noble was designed, founded and built over eight decades to address the national challenges of soil health, grazing land productivity and ranch viability. In recent years, Noble has further refined its mission to guide farmers and ranchers in applying regenerative principles that yield healthier soils, more productive and resilient grazing lands and business success. However, our core purpose remains unchanged: *to sustainably manage land, livestock, business and finance, people and community*. Research continues to serve as the cornerstone of our mission and a driving force behind our purpose.

A key goal of this 5-year plan is to guide the development of strategic collaborations that will complement and strengthen Noble's research mission. The plan will also serve as a tool to communicate our vision to external stakeholders and help identify funding opportunities that support our science-driven priorities.

While this document provides a clear pathway forward, we remain responsive to the evolving and often unpredictable challenges facing agriculture. As such, our research priorities may adapt over time to address emerging issues while staying true to our mission.

We invite you to join us on this exciting journey as we lay the foundation for the next 5 years of research working together to restore, preserve and enhance our grazing lands. ***Long live our grazing lands - science in service of stewardship!***

Our Commitment

Our research mission is to restore the integrity of the nation's grazing lands, with a special emphasis on soil health and sustainable food systems. At the heart of our mission is a commitment to aligning our research with the needs of producers. We firmly believe that producers should be engaged in all aspects of the research process, ensuring that our efforts remain relevant, practical and responsive.

With access to over 13,500 acres of working ranch lands, Noble operates a unique living laboratory where the impact of regenerative grazing management practices can be evaluated under real-world conditions. Instead of relying on small, controlled experimental plots, our approach is to use actively managed working lands to develop, test and refine management practices at the scale they apply. By bringing together ranch managers and researchers, we

can address producer's concerns related to productivity, soil health, biodiversity and resilience in the context and scale where they matter most. Our guiding principle is simple: solve real problems on real farms. This distinctive setting also helps bridge the gap between research and adoption and ensures that our findings are directly relevant, applicable and responsive to the challenges producers face. Our research outcomes also directly inform the educational initiatives offered by Noble, providing producers and land managers with unbiased knowledge and practical tools they can use immediately. In addition, this systems-based, multidisciplinary research approach is designed to inform policymakers and support the development of effective policies that ensure the long-term viability of grazing lands and the livelihoods of those who depend on them.

We are also committed to maintaining and enhancing Noble's strong reputation within the scientific community and continue positioning ourselves as a trusted source of science-based information and a recognized leader in sustainable agriculture research.

Noble is uniquely positioned to fulfill its promise and commitment to delivering practical and meaningful science-based solutions to producers. Our combination of extensive resources, expertise and long-term legacy in agricultural research and commitment to extending knowledge and education to producers places us in an ideal position to lead research efforts in advancing sustainable grazing land management.

Our Research Emphasis

Grazing lands, including native rangelands and introduced pastures, cover approximately 654 million acres in the U.S., accounting for ~40% of the nation's land area. These lands are critical to U.S. agricultural production, supporting the economy and livelihood of many rural communities. They also provide a wide range of ecological benefits, including carbon sequestration, water cycle regulation and biodiversity conservation.

Despite their critical role, many grazing lands in the U.S. are currently degraded or declining in functionality. Key drivers of degradation include overgrazing, declining soil health and encroachment of woody plant species. These issues have far-reaching consequences, from reduced livestock productivity at the farm-level to increased soil erosion, reduced plant diversity and declining ecosystem resilience across broader landscapes. Compounding the challenge is the historical underrepresentation of grazing land research within academic institutions, the scientific community and funding agencies. Much of the existing research remains fragmented, narrowly focused and short-term, often lacking relevance or applicability for producers. To bridge this critical gap, Noble has prioritized research efforts that focus on developing, evaluating and disseminating practical, science-based solutions with direct benefits for farmers, ranchers and landowners. We are also committed to communicating our research findings as broadly as possible, including both scientific and producer-oriented audiences to support adoption.

To achieve these goals, Noble's research efforts over the next 5 years will focus on the following five interconnected priorities:

1. Protecting and enhancing soils and other natural resources associated with livestock production

Soils are the foundation of agriculture, supporting more than just food production. They perform critical functions that support plant and animal production, resilience and ecological performance of grazing lands. However, when improperly managed due to erosion or overgrazing, soil's functions are compromised, leading to declines in productivity and negative environmental and economic impacts. Our research places strong emphasis on soil health and its critical role in sustainable livestock production. Our efforts focus on understanding how management practices affect the soil's physical, chemical and biological properties, with the goal of identifying strategies that

restore and maintain soil function. This includes investigating the effects of grazing management strategies, cover crops and other interventions that can impact soil health.

Biodiversity and wildlife habitat conservation are also key components of our research priorities. Balancing agricultural production and conservation goals has long posed a significant challenge for land managers and livestock producers in the U.S. and globally. Through science-based, systems-level research, Noble is focused on developing integrated solutions that address both production and environmental objectives.

2. Building resilient grazing land ecosystems that are productive, economically viable, and capable of delivering critical ecosystem services

Agricultural resilience is the ability of agricultural systems to withstand and recover from disturbance (e.g., climate variability, pests/diseases, land degradation) while maintaining their essential functions. In other words, it reflects the ability of an agroecosystem to maintain its structure, productivity and function in the face of stressors. While the concept of resilience has long been established in ecological science, its application in agricultural research is relatively recent. However, the concept directly supports producer's goals of maintaining sustainable levels of production despite external challenges such as drought and climate variability.

Although resilience can be difficult to measure precisely, various proxies have been proposed. For example, crop yield is often used as a metric of resilience. In grazing lands, forage quantity, diversity and nutritional value are critical indicators of sustainability as they directly influence animal performance, soil health, ecosystem resilience and long-term productivity. Since forages represent the primary source of nutrition for grazing animals, ensuring adequate forage quantity and quality is essential for maintaining livestock performance and economic viability. From an ecological perspective, diverse forage systems enhance stability by supporting balanced nutrient cycling, improving soil structure and increasing resistance to pests, drought and other stresses. Diverse forage systems are also more likely to sustain year-round productivity, reduce reliance on external inputs and support greater biodiversity.

Grazing lands provide a wide range of critical ecosystem services that extend well beyond livestock production. Among the most critical are their roles in supporting soil health, enhancing biodiversity, regulating water cycles and mitigating climate change. Well-managed grazing lands act as significant terrestrial carbon sinks, sequestering large amounts of carbon from the atmosphere through plant biomass and soil organic matter. They can also help offset methane emissions from livestock by increasing carbon sequestration and improving net carbon balance. Understanding the complex relationship between grazing management practices and the delivery of these ecosystem services is a high research priority. Identifying science-based strategies that optimize both agricultural productivity and ecological performance is key to strengthening the role of grazing lands as multifunctional systems that deliver a wide range of societal benefits.

Although Noble's research mission is centered on ecological and conservation principles, we are also equally committed to advancing the long-term profitability and viability of livestock ranching. For sustainable practices to be widely adopted, they must be economically feasible for producers. Noble recognizes that financial sustainability is essential for meaningful and lasting land stewardship. By integrating financial metrics with ecological, management and production data, our goal is to better understand how conservation practices influence overall ranch performance.

3. Promoting the multiple benefits of grazing lands to policymakers and the broader public through science-based communication and outreach

Developing effective solutions and demonstrating the value of grazing lands requires a strong foundation in the scientific process and a commitment to providing unbiased, science-based information. Science is the foundation for generating reliable information and insights into the ecological, economic and social contributions of grazing systems. In an era often influenced by misinformation and competing interests, Noble remains committed to transparency, scientific rigor and integrity. This commitment builds trust among policymakers, stakeholders and the public.

We aim to distinguish Noble as a leader in the field of regenerative agriculture through measurable, scientifically rigorous results and broad dissemination of our findings. This approach will enhance our institutional reputation and will also ensure that the adoption of regenerative principles is guided by unbiased and rigorous research. Relying on sound science enables us to communicate our findings to guide policy development and implementation. This approach also ensures that grazing lands are acknowledged and valued for the diverse ecosystem services they provide.

4. Supporting producer's ability to remain on the land by providing science-based solutions that address their needs and challenges

Supporting producers' ability to remain on the land requires responsive, practical science-based solutions that directly address the real-world challenges they face. These challenges are dynamic and often unpredictable, shaped by a range of internal (soil degradation, pests/diseases) and external (e.g., climate variability, market fluctuations, policy and regulations) factors. For research to be impactful, it must be grounded in the realities of agricultural operations and remain responsive to evolving needs of producers. As producer needs change, our research must evolve accordingly.

Noble's living laboratory approach where information can be developed and tested under real-world working conditions ensures that our findings are effective and feasible. This applied, on-the-ground research also increases the likelihood of adoption and builds trust and relevance among the producers we serve. Aligning our research with producer's needs and delivering practical, science-based outcomes enables Noble to more effectively support the livelihoods of farmers and ranchers while advancing broader goals of agricultural sustainability and land stewardship.

5. Evaluating new emerging technologies and innovations to improve land stewardship and livestock management

To remain relevant in agricultural research, it requires a proactive approach to evaluating emerging technologies and innovations. New tools and technologies such as remote sensing, precision livestock management and data-driven supporting systems have great potential to improve land stewardship and livestock productivity. These technologies are gaining momentum in the U.S. largely driven by producer's goals to improve livestock management efficiency, welfare and productivity. In addition to the operational benefits, these technologies can also improve agricultural stewardship by enabling more precise and efficient use of natural resources, including forage, soil and water.

Although the potential of these technologies is compelling, some major concerns exist. Questions about animal welfare, cost-effectiveness, animal and crop performance and environmental metrics remain largely unknown. Furthermore, assessing the extent to which these technologies can contribute to more sustainable crop-livestock systems or improve soil-plant-animal relationships require a multidisciplinary approach. Cross-disciplinary collaborations are essential to evaluate the technology's benefits, limitations and applicability in diverse production systems. Research focused on how

new technologies can help identify those with the greatest potential to enhance efficiency, sustainability and decision-making for producers. This research emphasis also ensures that our research remains forward-looking and responsive, while also equipping land managers with the tools they need to adapt to changing environmental, economic and regulatory conditions.

Our Vision

Our long-term vision is a future in which U.S. grazing lands are revitalized, resilient and sustainably managed to support healthy ecosystems, productive agricultural systems and the needs of future generations. Through rigorous applied research and strategic collaborations, we aim to be a trusted leader in developing and advancing innovative solutions that improve soil health, promote biodiversity, enhance livestock productivity and strengthen the economic viability of pasture-based livestock operations. We are committed to bridging the gap between science and practice by engaging producers in our scientific process and providing policymakers and the general public with unbiased, practical information that supports land stewardship. Our research efforts are also designed to guide and strengthen our educational programs, so we can accomplish our mission: *to guide farmers and ranchers in applying regenerative principles that yield healthier soil, more productive grazing land and business success*. Guided by the legacy of Noble's founder, we remain dedicated to preserving the integrity of grazing lands as essential ecosystems that sustain food systems, support the well-being of rural communities, and provide multiple benefits for society as a whole.

5-Year Research Priorities

