King Ranch: Ranching on the Edge

Authors: Derner, Justin D., Roberts, Kendall, Eisele, Mark, Wilmer, Hailey, Mortenson, Matt, et al.

Source: Rangelands, 44(6) : 411-417

Published By: Society for Range Management

URL: https://doi.org/10.1016/j.rala.2022.09.002

Research Note

King Ranch: Ranching on the edge

By Justin D. Derner, Kendall Roberts, Mark Eisele, Hailey Wilmer, Matt Mortenson, Pam Freeman, and Rex Lockman

On the Ground

- The King Ranch in Wyoming, established in 1911, has for generations been "Ranching on the Edge" and adapting to new challenges as they operate on the perimeter of Wyoming's largest city, Cheyenne.
- Lessons learned from King Ranch are highlighted regarding decision-making approaches, management strategies, and partnerships used to manage complex and highly variable systems for multiple goals.
- Challenges presented to the King Ranch were turned into opportunities—"make lemonade when lemons are presented"—through creative collaborations resulting in new economic opportunities providing an avenue to involve the next family generation, leveraging existing skill sets of personnel on the ranch and ranch assets, and embracing community-centric relations.
- Management-science partnerships involving multiple local, state, and federal entities on contemporary issues foster bidirectional knowledge transfer and learning for both ranchers and scientists.

Keywords: collaboration, co-production, King Ranch, natural resource management, management-science partnerships, Wyoming.

Rangelands 44():411–417
doi 10.1016/j.rala.2022.09.002

Introduction

Ranching has always been a dynamic and uncertain business. Today, cow-calf and yearling ranch operation managers in the western United States are constantly adapting to the many challenges, new and persistent, that come with running a complex, natural resource-based business. While each operation and decision maker is different, many of today's ranching businesses face similar challenges. Whether they are dealing with the effects of dynamic and extreme weather, or adjusting to uncertain and variable forage resources, working through who will manage the ranch in the future, or dealing with nearby exurban development and changing local communities, they must develop a wide set of skills and abilities to adapt to new situations. Individually, these challenges can be enough to cause financial and emotional stress for ranchers, but ranchers are often dealing with multiple challenges at the same time, while maintaining daily ranch operations and watching emergent situations unfold. This complexity creates high levels of social and ecological risk at multiple scales, for example risk of litigation or land use conflict, by putting ranching's social license to operate and public trust at stake, increasing the risk that younger generations will leave ranching because of financial challenges, and risks that various land uses will create undesirable ecological change. Moreover, as family ranch businesses, many of the ranches that range and animal scientists typically see as a target audience for forage and livestock production-oriented research operate instead for multiple goals, including profitability and long-term financial viability, biodiversity conservation, as well personal and family lifestyle amenities and wellbeing.[1]

In this paper, we aim to explore ways ranchers successfully balance economic, ecological, and family social objectives in a changing social context, using flexible and diversified approaches to enhance ranchers' abilities to take advantage of emergent opportunities, reduce risk, and continually learn about changing conditions.[2,3] We examine the King Ranch in Wyoming to describe how one operation has, for generations, adapted to new challenges while operating near Wyoming's largest city. Our goal is to offer key lessons learned from this ranch to the broader rangeland community. The case of the King Ranch, established in 1911, brings to light some of the decision-making approaches, management strategies, and partnerships ranchers use to manage complex and uncertain systems for multiple goals.

We provide background on the ranch and an overview of family ranch leadership, describe strategies for operating in a changing social context near a large municipality, and report on two coproduced research projects providing new knowledge to enhance ranch profitability and conservation goals.

Figure 1. The Eisele family. From left: Kaycee, Miranda (wife of Colton), Colton, Mark, Genevieve Roberts, Trudy, James Roberts (husband of Kendall), and Kendall Eisele Roberts. Photo courtesy of Jamie Leigh

King Ranch: The background

Urban and exurban development, as well as associated social and land use changes and relationships, have been identified as common and pervasive challenges for family ranch continuity and sustainability.[4,5] The historic King Ranch, which started as a sheep enterprise, is located on the western edge of Cheyenne, Wyoming, the largest city in the state with a population exceeding 65,000, and is a single example by which to understand how ranchers address these challenges. The ranch is family-owned and operated with the primary owner Mark Eisele and his wife Trudy, who also was the Laramie County Treasurer through 2022, and their son Colton (wife Miranda) and daughters Kendall (and her husband James Roberts and daughter Genevieve) and Kaycee (Fig. 1). Mark began working for the King Ranch (Jerry and Ann King) as a ranch hand in his teens. In the 1990s, the Kings offered Mark the opportunity to buy into the ranch and he became a full partner in 1997. After the death of Ann in 2011, Mark took over the responsibilities of the full ranch operations.

The ranch has received numerous land management and stewardship recognition awards: the 2015 Wyoming Leopold Conservation Award from the Sand County Foundation and the Wyoming Stock Growers Association, Centennial Ranch by the State of Wyoming in 2011, and the Wyoming Section SRM Excellence in Rangeland Stewardship award in 2005. The King Ranch is regionally recognized as a forward-thinking and innovative ranch embracing sustainability and multiple generation involvement in ranch operations and management.

The King Ranch contributes substantial time and efforts to beef producer and other organizations. Following a 3-year term as a regional vice president, Mark served as the 51st President of the Wyoming Stock Growers Association during 2012 and 2013. Mark was appointed by Governor Matt Mead as a member of the Wyoming Livestock Board in 2014 for a 6-year term. Kendall Roberts was the first President for the Young Producers Assembly of the Wyoming Stock Growers Association in 2016 and served a 6-year term on the Wyoming Board of Agriculture. Mark recently served as the Chairperson for the Policy Committee with the National Cattlemen's Beef Association and was just elected in February 2022 as their Vice President.

Within the perimeter of the King Ranch holdings, infrastructure exists for wind energy farms, oil and gas development, numerous energy pipelines and transmission lines, a private shooting range, and Interstate 80 (Fig. 2). In addition, the King Ranch lands provide for a water treatment facility, police shooting range, and landfill for the City of Cheyenne. This infrastructure and continued urban development pressure from Cheyenne westward creates challenges the King Ranch have turned into opportunities as they "Ranch on the Edge."

The King Ranch also holds a federal grazing permit with the USDA Forest Service on the Medicine Bow National Forest. The King Ranch allotment coincides with an area of high recreational use year-round, including hiking, snowshoeing, cross-country skiing, riding Utility terrain vehicles/All terrain vehicles (UTVs/ATVs), camping, hunting, and other uses. The King Ranch also has state of Wyoming land leases and participates in the popular walk-in access program for hunters.

Communication and collaboration are key elements of the King Ranch daily family operations. Because life and decision-making responsibilities on the ranch have always spanned multiple generations, and because each generation brings their own goals, knowledge, and approaches, King Ranch family members have learned to honor old traditions and wisdom, such as Ann King's practice of conducting visual pasture inspections multiple times a day, while accepting new ideas and contributions from younger members. Additionally, operating plans and information about infrastructure, business operations, and other operations manuals and records are explicitly documented and made available to the "team." This enables, for example, Mark or Kendall to share or delegate daily operations tasks and troubleshoot irrigation equipment challenges without worrying that only one of them knows how to operate the system or complete the task.

King Ranch: Making lemonade from lemons

The King Ranch embraces the philosophy of "making lemonade." When others had early concerns about wind energy, the King Ranch saw value in green energy for ranchers in terms of economic opportunities to enhance continuing involvement of the next generation, partnerships with engineering experts to determine best-suited types of wind devices and locations for installation, and restoration opportunities for additional ranch enterprises to generate income and leverage use of heavy equipment. Wind energy production from their lands and associated transmission capacity provides renewable energy for Microsoft's Data Center and Cloud, the National Center for Atmospheric Research Wyoming Supercomputer Center, and a Wal-Mart Distribution Center bordering the east side of the King Ranch. These facilities occupy a section of land known as Cheyenne North Range Business

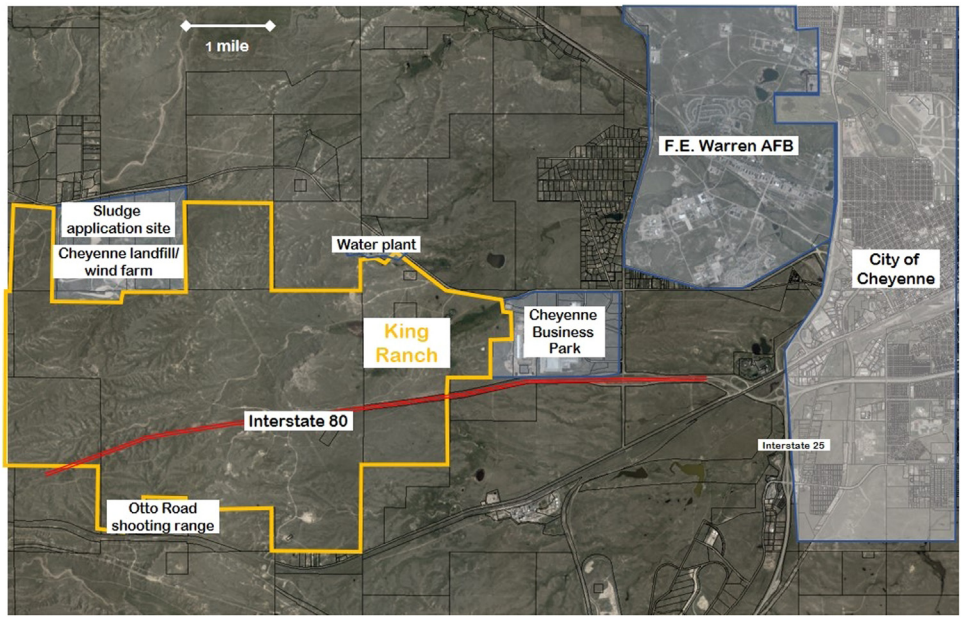

Figure 2. Eastern part of King Ranch with key infrastructure on the western edge of Cheyenne, Wyoming.

Park (http://www.northrangebusinesspark.com/). This land was initially proposed by developers as a high-density subdivision development, which would have resulted in potential conflicts with several thousand humans and pets. The King Ranch and other neighbors joined together in litigation activities to prevent the subdivision. As a result of their action, the developers changed from the high-density subdivision to the large commercial development, which was a preferred alternative to the King Ranch and other neighbors.

In the mid-2000s, the Sherard Water Treatment Plant was constructed for the City of Cheyenne on King Ranch property bordering Happy Jack Road (Wyoming State Highway 210). The King Ranch "made lemonade" in the sense that the ranch benefited from use of discharged water from filtering ponds, with this water used for irrigation on the ranch. Suspended sediments removed from the reservoir water that enters the Sherard Water Treatment Plant are periodically applied on King Ranch lands. Partnering with the Laramie County Conservation District and the USDA-Agricultural Research Service's Rangeland Resources and Systems Research Unit, monitoring of vegetation attributes and soils followed application of these suspended sediments in the spring of 2012. A water slurry containing these sediments was applied on a randomly chosen half of a winter-grazed section (130 hectares [320 acres]) of upland rangeland. Three blocks of monitoring areas were established on the applied and non-applied areas. At each block, a 25-m (82 feet) transect was established with three, 1 × 1 m (3.3 × 3.3 foot) temporary exclosure cages randomly located along each. These cages were moved a random distance and cardinal direction each spring before initiation of plant growth to provide locations for estimating annual forage production by plant functional groups in mid-July each year. Total forage production and production

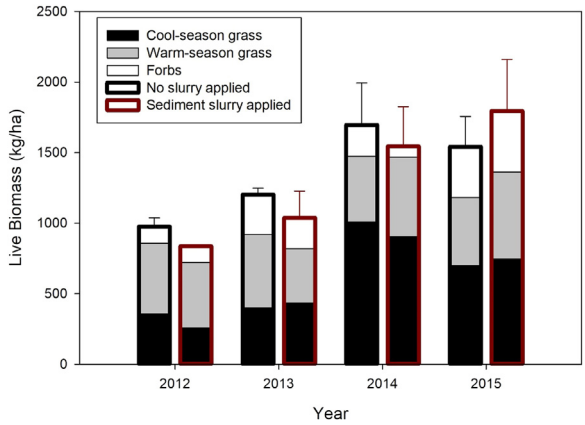

Figure 3. Mean (±1 SE) total (full bar) and plant functional group (shading within a bar) aboveground biomass (kg/ha) from areas on the King Ranch near Cheyenne, Wyoming, where a slurry mixture was applied in spring 2012 and a control.

by plant functional groups did not differ between treatments in any of the years (Fig. 3).

Two soil samples, 2-cm (0.8 inch) diameter x 15-cm (5.9 inches) depth, were taken from each transect in early spring 2012 (before slurry mixture application) and again in mid-July 2015 coinciding with biomass harvest. Soil samples were pooled at the treatment level before laboratory analyses. Substantial increases in organic matter, phosphorus, and iron were observed 3 years after the application, with little change in pH, electrical conductivity, and nitrate-nitrogen (Table 1). Results from this coproduced research demonstrates the lack of detrimental effects in soil attributes and similar forage production with these suspended sediments and water, which offers opportunities for the King Ranch and other neighboring ranch-

Table 1
Soil variables in 2012 before application of slurry mixture to loamy upland native mixed-grass prairie near Cheyenne, Wyoming, and 3 years after the application (2015)

Variable	2012	2015
pH	6.6	6.4
Electrical conductivity (mmhos/cm)	0.5	0.7
Sodium adsorption ratio	0.3	0.1
Organic matter (%)	2.6	6.2
Nitrate-N (ppm)	0.8	1.0
Phosphorus (ppm)	0.5	6.1
Potassium (ppm)	404.0	270.0
Zinc (ppm)	0.4	1.0
Iron (ppm)	13.4	30.3
Manganese (ppm)	3.3	4.7
Copper (ppm)	0.8	2.0

ers to work positively with the City of Cheyenne. This showcases how ranchers can mutually benefit from working with municipalities.

King Ranch: Management-science partnerships

Management-science partnerships can advance useful knowledge for sustainable range management, enhancing ranchers' ability to adapt to new conditions. The King Ranch has collaborated with the USDA-ARS in Cheyenne since 2003 and has historically advised in rangeland research, including "The Coyote Proof Fence Experiment" and early work at the US Sheep Experiment Station in Dubois, Idaho. The ranch currently participates in two coproduced research studies with long-term livestock grazing experiments at the High Plains Grasslands Research Station in Cheyenne, Wyoming,[6-8] and is one of many ranches participating in a western Great Plains regional monitoring project assessing diverse grazing management strategies on ecological outcomes.[9-10]

Long-term livestock grazing experiment: cow-calf

Since 2003, the King Ranch has been providing cow-calf pairs and yearlings for grazing research at the High Plains Grasslands Research Station. A key initial question was how would resting some pastures early in the grazing season for use later in the season affect livestock weight gains. Grazing cow-calf pairs early in the grazing season on one pasture and then shifting to another for late-season grazing could provide growing season rest to benefit dominant plant species in this northern mixed-grass prairie. How this management scenario affects cow, calf, and pair weight gains was a critical component to understanding if there were production tradeoffs resulting from emphasizing vegetation outcomes.

Together, the King Ranch and the USDA-ARS scientists designed and implemented a research project where pairs at

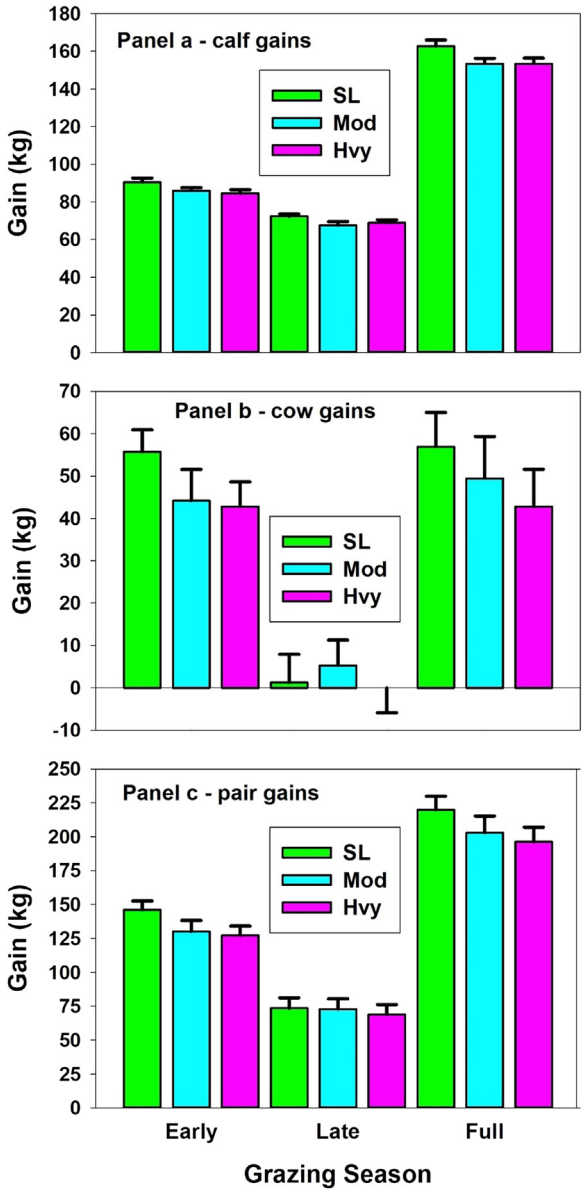

Figure 4. Mean (±1 SE) calf (A), cow (B) and cow-calf pair (C) weight gains (kg) during the early (early June to early August), late (early August to early October), and full (early June to early October) components of the grazing season from 2003 to 2012 in northern mixed grass prairie near Cheyenne, Wyoming. We evaluated three grazing scenarios: 1) season-long (SL) grazing at a moderate stocking rate (green bars), 2) moderate (Mod) stocking in one pasture during the early grazing season and then switched to a different pasture for the late grazing season (blue bars), and 3) heavy (Hvy) stocking in one pasture during the early grazing season and then switched to a different pasture for the late grazing season (purple bars).

either moderate or heavy stocking rates grazed during the early part of the grazing season (early June to early August) and then switched to other pastures for late season grazing (early August to early October). These treatments were compared with cow-calf pairs moderately stocked that grazed in pastures for the entire grazing season. Across the 10 years of this study (2003-2012), which encompassed a variable period of precipitation from wet to drought, calf (Fig. 4A), cow

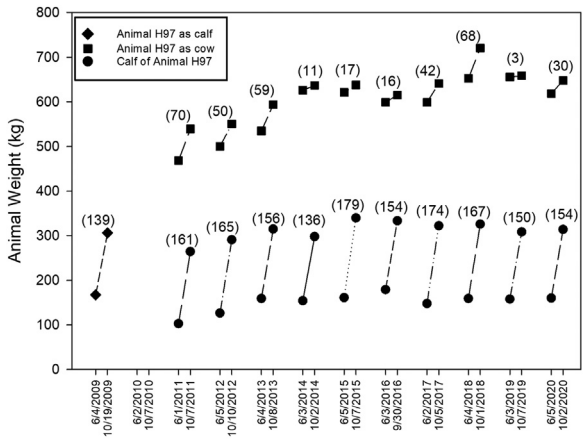

Figure 5. Seasonal weight gains for a single animal (Cow H97) from the King Ranch throughout her lifetime, first as a calf in 2009, then returning to the USDA-ARS High Plains Grasslands Research Station near Cheyenne, Wyoming as a nursing cow with calf (2011-2020). Numbers in parentheses are seasonal weight gains (kg).

(Fig. 4B), and cow-calf pair (Fig. 4C) gains were similar for the three grazing scenarios during the early, late, and full grazing season. Variability in gains among years was highest for cows and lowest for calves for all three components of the grazing season. Calf gains were nearly split evenly between the early (55%) and later (45%) halves of the grazing season. In contrast, almost all of the cow gains occurred during the first half of the grazing season. On average, calf gains represented 74% to 78% of the cow-calf pair gains for the entire grazing season.

Results from this coproduced research demonstrated cattle weight gains for cow-calf producers are not affected when ranchers managed for desired rest periods in this rangeland ecosystem. This showcases how ranchers can employ different grazing management strategies to achieve the same desired ecological outcomes while still achieving livestock production goals in the northern mixed-grass prairie.[10]

In addition, key livestock enterprise-level information for beef producers is provided through individual animal productivity data for individual animals over their lifespan (Fig. 5). Following a single cow and her calves throughout many seasons can provide useful information for ranchers regarding calf gains and maintenance costs of a cow. Cow H97 reached her mature weight at age six in 2014 (Fig. 5). Her calf progeny weight gains during the summer grazing season were consistent for 10 years (mean = 160.3 kg or 353.4 pounds, SE = 3.4 kg or 7.5 pounds). Anomalies in cow weight gains can be used to investigate factors such as cow age, environmental factors, or sire genetics.

Long-term livestock grazing experiment: yearlings

The King Ranch also contributes to long-term (since 1982) efforts by USDA-ARS to evaluate the effects of stocking rate on animal performance and rangeland conditions. A recent iteration of these long-term efforts combines adaptive grazing management and flexible stocking of King Ranch yearlings. The aim of this project is to quantify the outcomes of an adaptive grazing management system to eventually inform grazing systems to reduce risk and uncertainty associated with drought and low forage availability in the highly variable conditions of the Western Great Plains. In the project, King Ranch makes within and among-season changes to grazing and stocking based on prior grazing season vegetation residual amounts, spring precipitation, drought-monitored conditions, seasonal climate outlooks, and livestock market conditions and trends. Thus, scientific information sources are formally incorporated into an adaptive management planning process to guide management actions based on a combination of local knowledge and scientific data. We are evaluating livestock weight gains and grazing animal dietary quality and composition (Jorns et al, in prep), as well as agricultural economic effects (in process). This study, which focuses on research with ranchers rather than on them or on grazing systems removed from rancher local knowledge in the abstract, provides locally relevant information for the King Ranch and others regionally seeking to understand the costs and benefits of adaptive management approaches. It will also provide a model for incorporating rangeland, climate, and weather monitoring data into local expertise for management approaches to reduce risk and bolster profitability.

Western Great Plains ranch monitoring

A research ranch monitoring project in the western Great Plains region, initiated in 2012, simultaneously boosted King Ranch's capacity to collect and interpret ranch-scale data and contributed to broader knowledge of ranch decision-making outcomes in the region. This project aims to broadly document the ecological outcomes of grazing and rangeland management decision-making of ranchers.[10] Three plots within Loamy Plains ecological sites are located on King Ranch pastures representing key areas identified as an area with the most "room for improvement," an area with the "best outcomes" from grazing management (both established in 2012), and a randomly chosen plot (established in 2014). These plots have been annually monitored for basal cover using the line-point intercept method, photo points, and plant height using the visual obstruction reading method (i.e., Robel Pole method; Fig. 6). When we pooled 2014 to 2015 data with monitoring on ranches with similar grazing strategies in the region and controlled for precipitation, no differences in plant community composition were observed on ranches with more intensive or continuous rotational grazing systems, though ranchers with higher stocking rates and with cow-calf plus yearlings did have, on average, more cool season annual grass cover and less cool season perennial grass cover.[6] This monitoring partnership gives the King Ranch additional capacity to monitor and interpret vegetation change, and allows researchers to compare King Ranch outcomes to those from ranches across the region as part of a larger and more generalizable study.

In summary, we have outlined several strategies, collaborations, and approaches to learning used on the King Ranch to address emergent challenges in the ranching industry. The

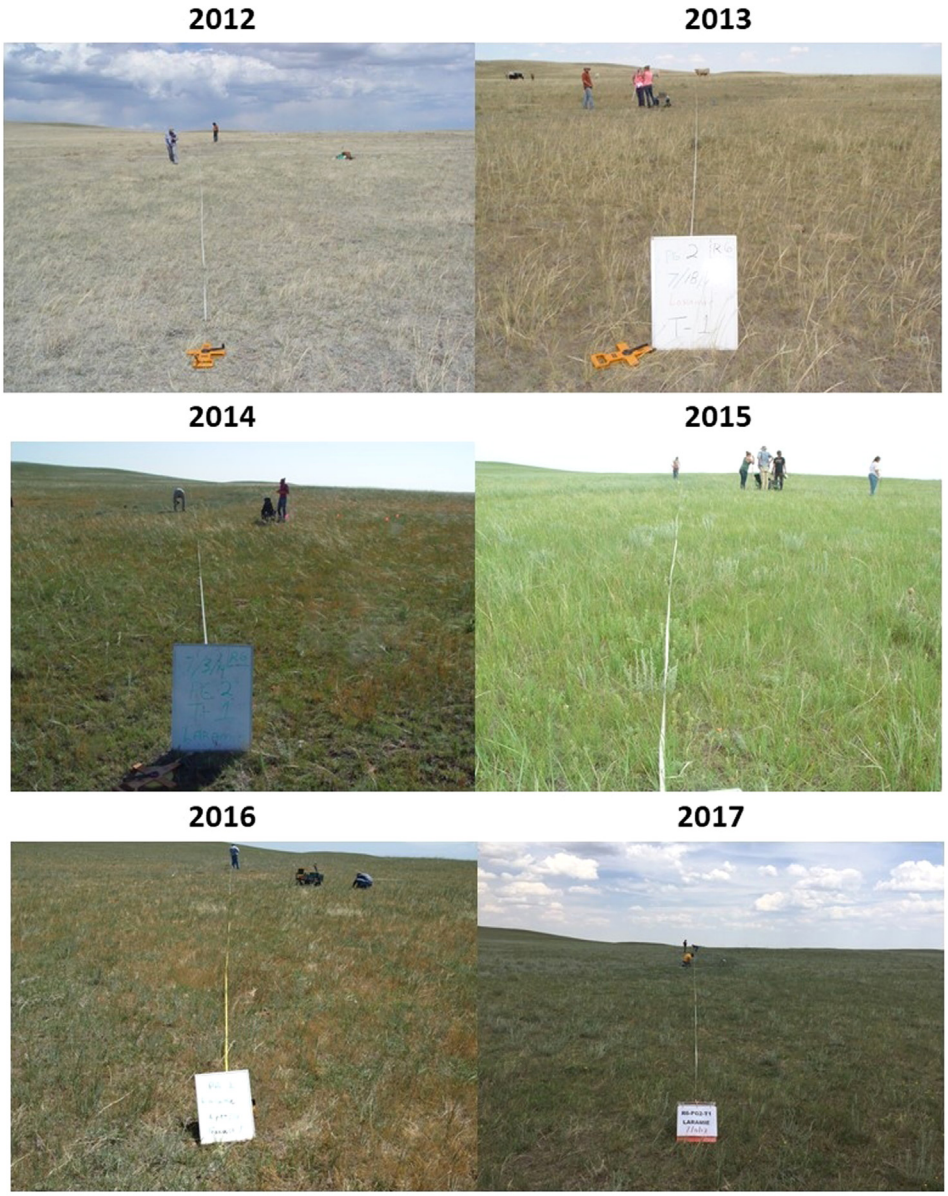

Figure 6. Annual photo points for vegetation monitoring on the King Ranch (2012-2017) near Cheyenne, Wyoming, as part of a research project on numerous ranches in the western Great Plains region.

historical context of the King Ranch operation and the family's team leadership approach set the stage for a diversified, flexible enterprise successfully balancing economic, ecological, and family operation objectives. Turning lemons into lemonade or creating operational opportunities from challenges such as proximity to a large municipality is one example of a guiding philosophy enabling growth and learning on the ranch. Further, participation in coproduced research provides benefit to USDA-ARS researchers, who gain additional data for ranching-relevant publications and ranchers alike. While coproduction has gained a great deal of recent attention, we recognize it may not serve the goals of all ranchers regarding rancher knowledge and research participation.[11] But, like many ranchers around the West, King Ranch family members see value in participating in research because it helps produce new, useable, and locally relevant knowledge while bolstering their social networks with researchers, students, and other industry contacts.

Conclusions

There are many paths to successful ranching and rangeland management. As social, ecological, and economic conditions change, successful ranchers maintain good communication and social networks, creatively maintain multiple forms of flexibility, seek out new partnerships and knowledge, and find ways to turn challenges into opportunities. The King Ranch illustrates how this commitment to adaptation can enhance ranch profitability and longevity, while also creating ecologically and socially beneficial outcomes for rangeland systems by enhancing wildlife habitat, avoiding rangeland conversion,

and sustaining social and cultural ties to the land. It is not uncommon for the King Ranch owners to mention their own limitations or past missteps. We highlight the King Ranch's operational strategies, involvement in coproduced research, and approaches to turning challenges into opportunities because this story offers a window into one ranch's successful decision-making for rangeland managers, ranchers, scientists, and others in the rangeland realm.

"Ranching on the Edge" of a growing city like Cheyenne, Wyoming provides substantial challenges and opportunities to the King Ranch. Subdividing the ranch into ranchettes could provide substantial financial returns given the proximity of the ranch on the western edge of Cheyenne. In contrast, the King Ranch steadfastly resolves to showcase sustainable ranching to the community, provide educational opportunities for K to 12 students through the school districts, 4-H, and FFA, many youth groups including beginning hunters, and the public including numerous resource tours of the ranch for local, state, national, and foreign visitors. The King Ranch offers birding opportunities, fishing opportunities for Wounded Warriors, cooperates with the City of Cheyenne on existing infrastructure within their land holdings, and actively engages in management-science partnerships to provide coproduced information and knowledge. Collectively, this is a testament to the vision, leadership, and commitment of the family to the cultural heritage of ranching. Continual learning about contemporary topics, combined with participation and leadership positions in industry and producer group organizations demonstrates how the King Ranch "ranches on the edge" in today's ranching industry.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests. The authors certify that they have no financial interest in the subject matter discussed in the manuscript. H.W. is a current member of the Rangelands Steering Committee but was not involved in the review or decision process for this manuscript.

Acknowledgements

We thank the invaluable contributions of numerous seasonal field technicians in collecting monitoring data. We thank Emily Kachergis for her efforts in initiating the western Great Plains regional ranch visit study. Funding for this study provided by the USDA-Agricultural Research Service and the Western Sustainable Agriculture, Research, and Education program (Project Number SW10-1073).

References

1. Didier EA, Brunson MW. Adoption of range management innovations by Utah ranchers. *Range Ecol Manag*. 2004; 57:330–336. doi:10.2111/1551-5028(2004)057[0330:AORMIB]2.0.CO;2.
2. Sayre NF, Carlisle L, Huntsinger L, Fisher G, Shattuck A. The role of rangelands in diversified farming systems: innovations, obstacles, and opportunities in the USA. *Ecol Soc*. 2012; 17(4):43. doi:10.5751/ES-04790-170443.
3. Carlisle L. Diversity, flexibility, and the resilience effect: lessons from a social-ecological case study of diversified farming in the northern Great Plains, USA. *Ecol Soc*. 2014; 19(3):45. doi:10.5751/ES-06736-190345.
4. Brunson MW, Huntsinger L. Ranching as a conservation strategy: can old ranchers save the new west? *Range Ecol Manag*. 2008; 61:137–147. doi:10.2111/07-063.1.
5. Bruno JE, Fernández-Giménez ME, Balgopal MM. An integrated livelihoods and well-being framework to understand northeastern Colorado ranchers' adaptive strategies. *Ecol Soc*. 2021; 26(4):27. doi:10.5751/ES-12754-260427.
6. Hamilton TW, Ritten JP, Bastian CT, Derner JD, Tanaka JA. Economic impacts of increasing seasonal precipitation variation on southeast Wyoming cow-calf enterprises. *Range Ecol Manag*. 2016; 69:465–473. doi:10.1016/j.rama.2016.06.008.
7. Irisarri JGN, Derner JD, Porensky LM, Augustine DJ, Reeves JL, Mueller KE. Grazing intensity differentially regulates ANPP response to precipitation in North American semi-arid grasslands. *Ecol Appl*. 2016; 26:1370–1380. doi:10.1890/15-1332.
8. Porensky LM, Mueller KE, Augustine DJ, Derner JD. Thresholds and gradients in a semi-arid grassland: long-term grazing treatments induce slow, continuous, and reversible vegetation change. *J Appl Ecol*. 2016; 53:1013–1022. doi:10.1111/1365-2664.12630.
9. Kachergis E, Derner JD, Cutts BB, et al. Increasing flexibility in rangeland management during drought. *Ecosphere*. 2014; 5:1–14. doi:10.1890/ES13-00402.1.
10. Wilmer H, Augustine DJ, Derner JD, et al. Diverse management strategies produce similar ecological outcomes on ranches in western Great Plains. *Range Ecol Manag*. 2018; 71:626–636. doi:10.1016/j.rama.2017.08.001.
11. Wilmer H, Fernández-Giménez ME. Rethinking rancher decision-making: a grounded theory of ranching approaches to drought and succession management. *Range J*. 2015; 37:517–528. doi:10.1071/RJ15017.

Authors are from: Supervisory Research Rangeland Management Specialist and Research Leader, USDA-Agricultural Research Service, Rangeland Resources and Systems Research Unit, Cheyenne, WY, 82009, USA (Justin D. Derner, Justin.Derner@usda.gov) Owners, King Ranch, Cheyenne, WY, 82009, USA (Kendall Roberts, Mark Eisele); Research Rangeland Management Specialist, USDA-Agricultural Research Service, US Range Sheep Production Efficiency Research Unit, Dubois, ID, 83423, USA (Hailey Wilmer) Agricultural Science Research Technician, USDA-Agricultural Research Service, Rangeland Resources and Systems Research Unit, Cheyenne, WY, 82009, USA (Matt Mortenson, Pam Freeman); Wildlife and Range Specialist, Laramie County Conservation District, Cheyenne, WY, 82009, USA (Rex Lockman)