

Research Snapshot

COLLEGE OF AGRICULTURAL, CONSUMER AND ENVIRONMENTAL SCIENCES

Agricultural science research is a global investment in protecting the future of our state. Agriculture in New Mexico accounts for approximately \$4 billion in direct sales and 42,000 jobs. Challenges to growers and ranchers are constant and evolving. Invasive pests, a decline in species diversity, pollinator health, resistance to pesticides, and limited water are needs that are being addressed by New Mexico State University's Agricultural Sciences Centers. The wide diversity of both growing conditions and cultures means solutions must be developed locally in conditions that reflect those faced by New Mexicans.



CHIHUAHUAN DESERT RANGELAND RESEARCH CENTER

New Mexico State University operates the Chihuahuan Desert Rangeland Research Center (CDRRC) to conduct educational, demonstrative, and experimental development with livestock, grazing methods, and range forage, including investigating sustainability and management of natural resources and ecosystems.

UNDERSTANDING THE NEED FOR RESEARCH

Several ranchers owned portions of the land now constituting the CDRRC. In 1925 Max Vanderstucken, who then owned the land, was facing foreclosure and spoke to J.L. Lantow, head of the Animal Husbandry department at New Mexico A&M. He recommended the College buy his ranch; in February 1926 the College acquired his land, with grazing rights on adjoining public lands. In 1927, Congress granted public lands to the College for research purposes. The last parcel was acquired in 1984 through a "land swap" between the federal government and the State of New Mexico.



HISTORY OF RESEARCH

The CDRRC is used for teaching, demonstration, and research projects with livestock, grazing methods, and range forage, including investigations into the sustainability and management of natural resources and environmental ecosystems. Teachers, researchers, and students from across campus benefit from the center. The center is part of the Jornada Basin Long-Term Ecological Research project, part of the National Science Foundation Ecology Network. Current research efforts include:

- Evaluating continuous and seasonal grazing strategies at different intensities to determine effects on livestock performance as well as plant cover and composition.
- Evaluating the performance of breeds of cattle concerning the quality and quantity of forage in a hot, arid environment.
- Determining the influence of range conditions on wildlife populations.
- Study of interactions of plant species.
- Assessing competition and other interactions between common plant species.
- Ascertaining the role of small herbivores in a desert environment.

ACES Pillars for Economic and Community Development

Food and Fiber Production and Marketing

Water Use and Conservation

Family Development and Health of New Mexicans

Environmental Stewardship

Foundational Education and Training

RESEARCH IMPACTS:

- Long-term data collected at the Chihuahuan Desert Research Center show that since the 1970s, forage production has decreased 38%, variability in annual precipitation has increased, summers have become hotter, and monsoon seasons occur later. Beef production in the desert SW needs to adapt to this evolving scenario if ranching is to remain viable. Feasibility of raising desert-adapted Criollo cattle is one alternative being researched. This research is expected to produce highly relevant climate adaptation science benefiting ranchers in New Mexico and beyond.
- Real-time monitoring of livestock and other ranch resources has the potential to reduce ranching costs, free-up time for beef producers, and improve animal welfare. Real-time monitoring using LoRa WAN communication systems (currently being tested at CDRRC) paired with sophisticated data analytics should allow us to develop the first precision ranching system in the western U.S.A.
- In collaboration with the Jornada Experimental Range (USDA ARS), the CDRRC incorporated studies initiated in 1915 into the JRN LTER program. Previous research focused on desertification, a state change from perennial grasslands to woody plant dominance (i.e., desertified shrublands) that occurs globally. Based on findings from growing long-term databases, the breadth of studies was expanded to include four additional state changes that occur in dryland systems: a reversal from desertified shrublands to grassland states; transitions among different states dominated by woody plants; invasion by non-native grasses leading to novel states; transitions to human-dominated states. Processes of interest include water mediated plant-soil feedbacks; patch-scale contagion by wind, water, and animals; landscape context; and time lags that are manifested as nonlinear dynamics and threshold behavior. These cross-scale interactions (the interactions between patterns and processes across scales) often lead to emergent behavior of broader scales that are not predicted from fine-scale patterns.

UNIQUE CHARACTERISTICS

- Several vegetation types are present at the CDRRC. Creosote bush dominates the upper slopes of the mountains and the hills along the river. At lower elevations, the creosote bush type grades into the mesquite type that grows on sandier soils, and into the tarbush type on heavier soils. The plains area, once dominated by black grama, today has been invaded by mesquite stands, which are interspersed with snakeweed and many species of grasses and forbs.
- Wildlife populations on the CDRRC are rich and varied. Several bird species migrate throughout the area, but a large number also live and nest on the rangeland. Numerous lizard and snake species also inhabit these lands.
- The CDRRC has livestock grazing pastures that have been observed and recorded to measure changes without livestock influence for over 80 years. The long-term nature of grazing and climate studies are increasingly valuable because other studies of this magnitude do not exist, yet represent ecological and climatic problems facing the earth's arid lands.



Chihuahuan Desert Rangeland Research Center

New Mexico State University

MSC 3-1, P.O. Box 30003

Las Cruces, NM 88003

Phone: (575) 646-2554

Fax: (575) 646-5441

Email: dwbailey@nmsu.edu

Web: <https://chihuahuansc.nmsu.edu/>

Agricultural Experiment Station System