



United States Department of Agriculture Agricultural Research Service

Resilient Beef-Forage Systems: The NIFA-AFRI-CAP Partnership

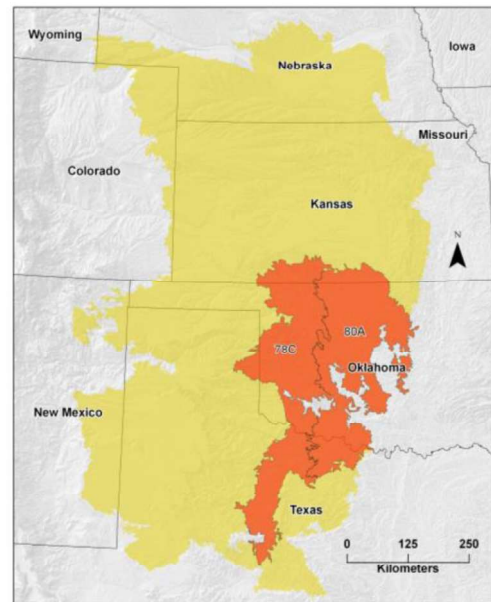
Grazinglands Research Laboratory, El Reno, Oklahoma

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Rationale: Beef produced on pasture and rangeland forages and dual-purpose winter wheat in the Southern Plains (SP: Texas, Oklahoma, and Kansas) provides a significant portion of the nation's red meat while contributing greatly to farm income in the region. However, beef production and farm income in the SP fluctuate wildly because of large climate variability. The 2010/2014 drought, terminated by some of the most extreme precipitation events on record, in loss of billions of dollars in the agriculture sector, raises questions about vulnerability and resilience of this important food supply system. What are future magnitudes of climate variability and change in the SGP? What are the most vulnerable aspects of the region's beef-grazing enterprises? How resilient are these enterprises to likely changes in climate, land use and markets? What management practices and technology innovations would strengthen the resilience and reduce carbon, nitrogen, and water footprints of these production systems? What are the tradeoffs between beef production and maintaining ecosystem services, both essential to meet needs of an increasing human population?

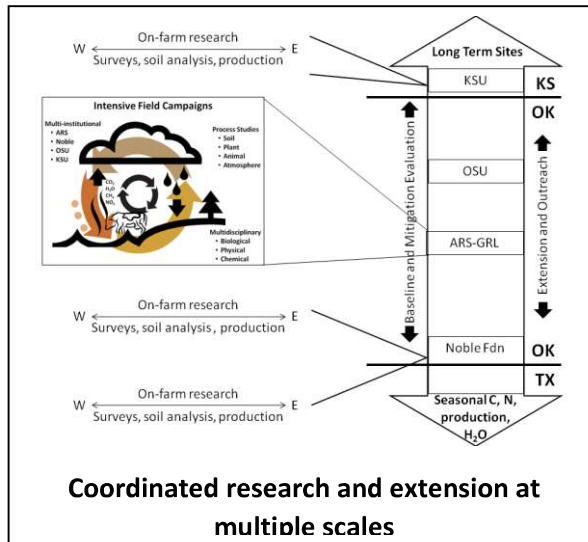
Objective: Our **long-term goals** are: 1) to better understand vulnerability and enhance resilience of SGP beef-grazing systems through introduction of diversified forages, improved management, multiple marketing options, strategic drought planning, and improved decision support systems for evaluation of alternative options; and 2) to safeguard and strengthen production and ecosystem services while mitigating greenhouse gas emissions in the SGP. Additional goals are:

- To build capacity and strengthen collaboration to empower and enable research and extension at a higher level of integration.
- To understand, monitor and forecast dynamics of beef-grazing production systems; and balance and safeguard the sustainability of beef production and ecosystem services.
- To provide timely and accurate information, decision support tools, management practices and technologies that will assist and empower producers to employ risk- and evidence- based information in their decision-making.
- To train and educate the next generation of ranchers, farmers and researchers to collectively address challenges due to climate variability, land use change and market dynamics.



The Southern Great Plains highlighting

What we are doing: A collaborative team of research and extension specialists from Kansas State University, the Agricultural Research Service at El Reno and Bushland, Texas University of Oklahoma, Tarleton State University Oklahoma State University, and The Samuel R. Roberts Foundation are conduct experiments at multiple scales to develop new knowledge and evaluate improved plant materials, animal efficiencies, and production practices; develop and apply improved models to understand how the systems may respond to varying climate and economic drivers; and link research closely with extension programs aimed to address



producer needs and consumer preferences as related to beef production practices and products. The partnership leverages internal resources with external funding provided from 2013 to 2018 by the USDA-National Institute for Food and Agriculture (NIFA) as a Coordinated Agricultural Project in Climate Variability and Change. Baseline sampling across a network of long-term research sites has been collected since 2014 and intensive field campaigns began in 2014. In 2016, we partnered with the USDA Southern Plains Climate Hub to initiate a network of on-farm research focused on managing for improved soil health.

Summary: The project will advance adaptation of beef production systems to climate variability. In addition, improved management offers potential for mitigation of enteric methane emissions through improved forage quality and soil nitrous oxide emissions through improved nutrient management. Sustainable cow-calf and stocker cattle production systems and ecosystem services is essential for the regional economy and society at large. Information systems and decision support tools from the project can also be used in other parts of the world, where beef-grazing systems provide food and ecosystem services to billions of people.

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