Sustainable Southwest Beef Project

Year Three: Top 10 Accomplishments

1. **The Asombro Institute for Science Education collaborated with all three research teams to develop and deliver 11 lessons for K-12 students. The BlueSTEM AgriLearning Center has adopted Asombro's template and protocols and are developing five additional lesson plans.**
2. **The Asombro staff taught the new lessons to 1,385 K-12 students as well as 113 teachers who bring the lesson plans to thousands more students in their classrooms.**
3. **Twenty-four high school students conducted research projects on sustainable food systems; soil, water, and nutrient management; animal science, and plant science at the BlueSTEM Agrilearning Center, capped by poster sessions at school, community, and state science events.**
4. **The breed comparison team obtained new breeding bulls to maintain the Raramuri Criollo (RC) genetics within the research herd and expanded research to characterize genotypic and phenotypic characteristics of the RC cattle.**
5. **The precision ranching team has developed more robust and lower cost systems for LoRaWAN communication and base stations and animal tracker systems which were deployed on three research ranches in preparation to install systems on collaborating ranches.**
6. **The precision ranching team is developing a dashboard linked to databases on university and cloud-based servers which are supporting data visualization and machine learning development of products to support ranch management. The team is exploring different applications for virtual fencing technology.**
7. **The supply chain team developed performance indicators, to measure how well precision ranching and criollo cattle production systems achieve sustainability targets for Southwestern ranches. Stakeholder feedback is providing the basis for refinement and implementation.**
8. **Across the beef supply chain, opportunity exists to reinforce and introduce nutrient circularity by recycling manure nutrients from cattle feedlots to lands where cattle feed is produced. We developed and published four datasets to evaluate options in U.S. and Canadian beef systems.**
9. **Participants from a variety of backgrounds and professions engaged in conversations about sustainability at a field day cosponsored with The Nature Conservancy at the Dugout Ranch in Utah to showcase Raramuri Criollo cattle and other sustainability related research.**
10. **The Extension team reached 240 stakeholders directly through webinars or presentations to increase knowledge of novel strategies for sustainability in southwestern ranching.**

Goals

The Sustainable Southwest Beef Coordinated Agriculture Project (CAP) is a five-year USDA-NIFA funded project that promotes ranch and rangeland resilience in the Southwestern US. The team is evaluating strategies to help keep ranching and rangelands ecologically and economically healthy as climate, markets, and policies change. Specific strategies are:

- **Heritage Raramuri Criollo cattle**
- **Precision ranching technologies**
- **Tradeoffs among beef supply chain options from pasture to plate**

What We Do

- **Evaluate the economics, viability, ecological factors, and tradeoffs associated with the three strategies for sustainable beef production on Southwestern rangelands.**
- **Develop lesson plans for K-12 education that center around sustainability in beef production.**
- **Engage ranchers, educators, and students in collaborative research and extension to develop and train the next generation of researchers and producers.**
- **Develop the "Southwestern Beef Knowledge System" to share the science in an on-the-ground and user-friendly form.**

Progress

All aspects of research advanced significantly in Year 3. Graduate students and early career researchers progressed in their projects and many moved on to careers in their disciplines. Research findings were communicated to K-12 students and educators through innovative lesson plans. Extension teams worked with research teams to engage diverse stakeholders for key findings and technologies.

Team Leaders

Project Leadership

Project Director: Glenn Duff (NMSU)
Project co-director: Sheri Spiegal (ARS)

Team Leaders

Breed Comparison Research:
Rick Estell (ARS)

Precision Ranching Research:
Santiago Utsumi (NMSU)

Supply Chain Research:
Sheri Spiegal (ARS)

Extension/Outreach:
Emile Elias & Skye Aney
(USDA SW Climate Hub)

Education

Asombro Institute:
Stephanie Bestelmeyer

BlueSTEM AgriLearning Center:
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Evaluation

Office of Educational Innovation and Evaluation (KSU)

United States Department of Agriculture
National Institute of Food and Agriculture

This research is part of five-year coordinated agricultural project (CAP) supported by the USDA-NIFA Award No. 2019-69012-29853 "Sustainable Southwest Beef"