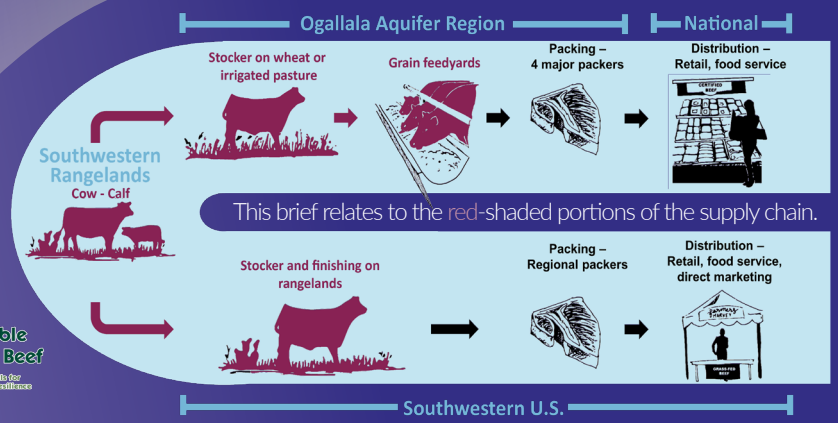


Sustainable Southwest Beef Project

Beef Brief:

GRASS FINISHING OF CRIOLLO CATTLE PROVIDES AN ENVIRONMENTALLY PREFERRED AND ECONOMICALLY FEASIBLE MEAT SUPPLY CHAIN

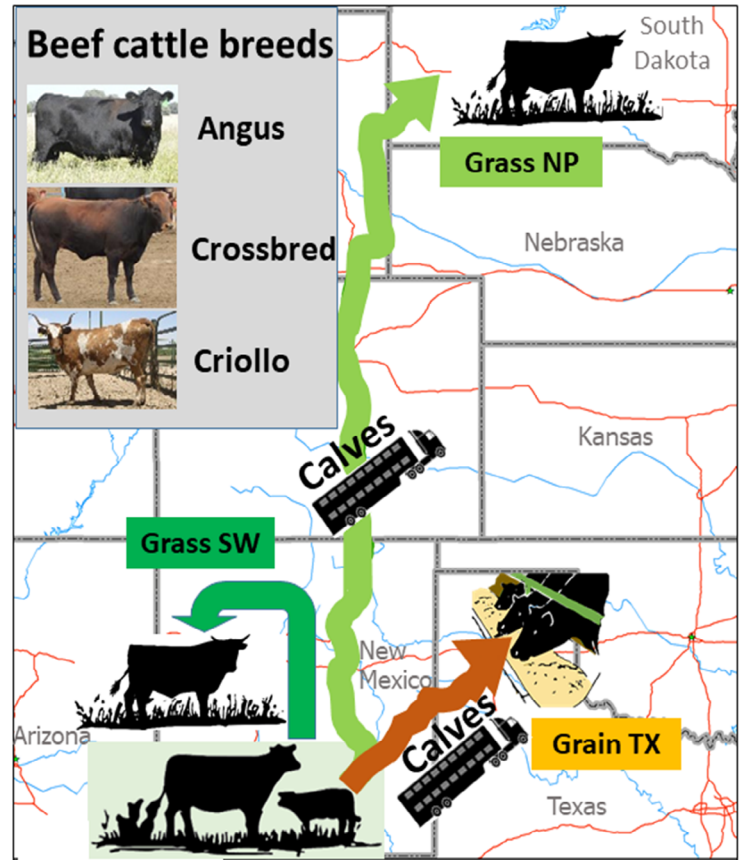


The Background

Cattle ranching is one of few ways to produce food on the arid rangelands of the U.S. Southwest, but a warming and drying climate is introducing new challenges. Adaptation strategies are needed that maintain or improve both environmental quality and profitability. Options include the use of desert-adapted beef cattle biotypes, such as Rarámuri Criollo cattle, and crossbreeding of Criollo with more traditional British genetics such as Angus. Currently, most calves raised in the Southwest are Angus. They are grain finished, often using irrigated crops produced in the hydrologically-threatened Ogallala Aquifer region. A viable alternative may be grass-finishing with rainfed forage on the rangeland of the Southwest or in the temperate grasslands of the Northern Plains. Our objective was to determine if the use of Criollo genetics could improve the sustainability of cattle production originating in the Southwest.

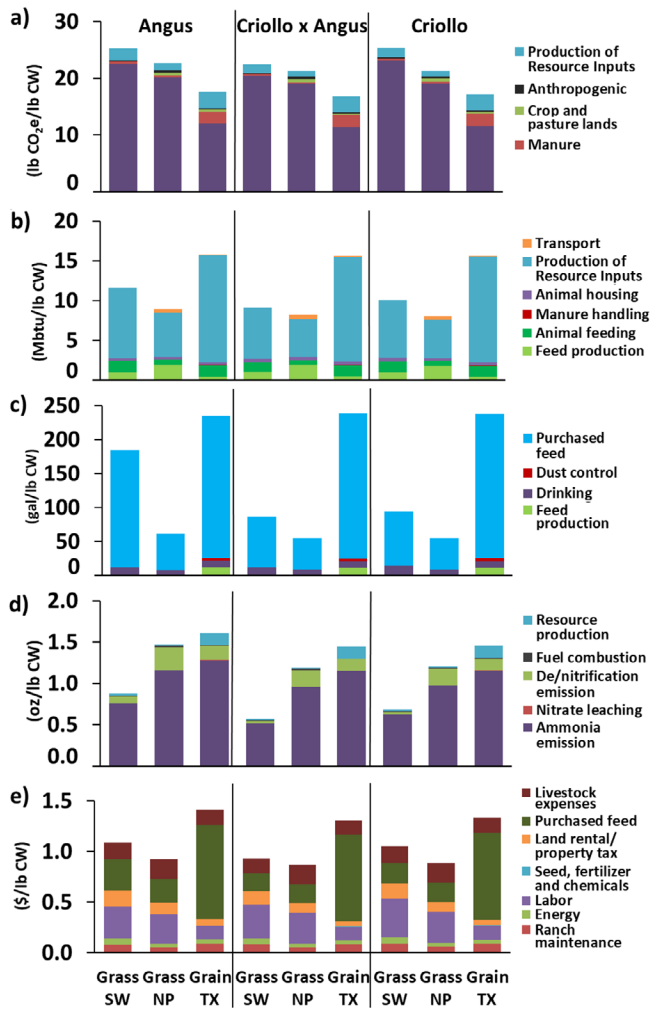
Supply chain options:

We used simulated cattle production systems to compare the environmental impacts and economic feasibility of grain- and grass-finishing using traditional Angus, Criollo, and Criollo x Angus cattle. We compared nine production systems consisting of the three breed options born on cow-calf operations of the Southwest with three finishing options (all-grass diet finished in the Southwest, all-grass diet finished in the Northern Plains, and high-grain diet finished in a Texas Panhandle feedlot). The nine supply chain options were simulated using the Integrated Farm System Model to compare farm-gate life cycle



Nine beef supply chain options originating on southwestern ranches. Map depicts the distribution of the 3 finishing options with the 3 breed options. Finishing options are grain finished in Texas Panhandle (Grain TX), Grass finished in Northern Plains (Grass NP), and grass finished in Southwest (Grass SW).

intensities of greenhouse gas emissions (carbon footprint), fossil energy use, nitrogen losses, blue water consumption and production costs using representative (appropriate soils, climate, and management) ranch and feedlot operations. This model was previously verified and used to estimate beef cattle performance and environmental impacts for various production systems in different regions of the US and for the whole US.



Greenhouse gas emission (a); fossil energy use (b); water consumption (c); reactive nitrogen loss (d) and production cost (e) per kilogram of carcass weight (CW). Systems are grass finished in Southwest (Grass SW), grass finished in Northern Plains (Grass NP), and grain finished in Texas panhandle (Grain TX).

Supply chain comparisons:

Regardless of finishing options, Criollo x Angus crossbred cattle had the most desirable environmental impacts (3%–27% lower) and production costs (4–23% lower), followed by pure Criollo cattle and then Angus. Crossbred production improved production efficiency by combining the desert-adapted grazing behavior of Criollo cows with the heavier final carcasses of offspring from Angus genetics and added hybrid vigor through cross breeding.

Crossbred cattle with grass finishing in the Southwest or Northern Plains outperformed on most environmental variables as well as production costs, mostly due to reduced external input requirements (primarily supplemental feed). A downside for grass-finished systems was a greater (27–42%) carbon footprint compared to grain finishing because of greater methane emissions using high forage diets and an extended time to finish. Grass finishing in the Northern Plains provides a more reliable meat supply chain than grass finishing in the Southwest due to lower risk and less severe consequences of drought. Where soil carbon sequestration can be supported, sequestration may offset the greater greenhouse gas emission from grass-finished beef.

Recommendation:

Alternative grass-finished beef supply chains using Criollo cattle genetics provide sustainable production systems that can be adopted by ranchers in the southwestern United States to help adapt to the changing climate.

For more information please visit southwestbeef.org

Source: Castano-Sanchez, J., C. A. Rotz, M. M. McIntosh, C. Tolle, C.A. Gifford, G.C. Duff, and S.A. Spiegall. 2023. Grass finishing of Criollo cattle can provide an environmentally preferred and cost effective meat supply chain from United States drylands. *Agric. Systems*. 210:103694. DOI:10.1016/j.agsy.2023.103694

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