

Beef Production: A Grand Challenge

The beef production system, in stark contrast to the vertically integrated hog and poultry production systems, is highly complex with cow-calf producers, numerous background and yearling enterprises, and the feedlot sector – with all the parts attempting to optimize conversion of plant materials (forage, cover crops, crop residues, grains and grain by-products) into nutritious animal protein in the most efficient manner. This complexity and emergent technology present to monitor/assess cattle (see the photo below for the “technological steer of 2018”) provides us with several questions. First, what do we really understand about the Beef Production System? Second, with all of the available “Big Data”, shouldn’t we know more about how cattle perform in specific localities? Third, how are the numerous inputs harnessed to improve the nutritional quality of the beef product? In an attempt to answer these questions, multiple research groups in



WE WOULD LIKE YOUR INPUT ON THESE STUDIES. PLEASE CONTACT JUSTIN. DERNER@ARS.USDA.GOV.

the USDA-Agricultural Research Service (located in Cheyenne, WY; Fort Collins, CO; Clay Center, NE; Miles City, MT; El Reno, OK; Woodward, OK; and Grand Forks, ND) and land grant universities (University of Wyoming, Colorado State University, Texas A&M University) have agreed to leverage existing resources in an effort to assess the contributions of genetics (G), environment (E) and management (M) on the beef product (P).

There are two main aspects of this cross-site collaboration. First, a set of weaned calves representing the 5 major cattle breeds from the Clay Center,

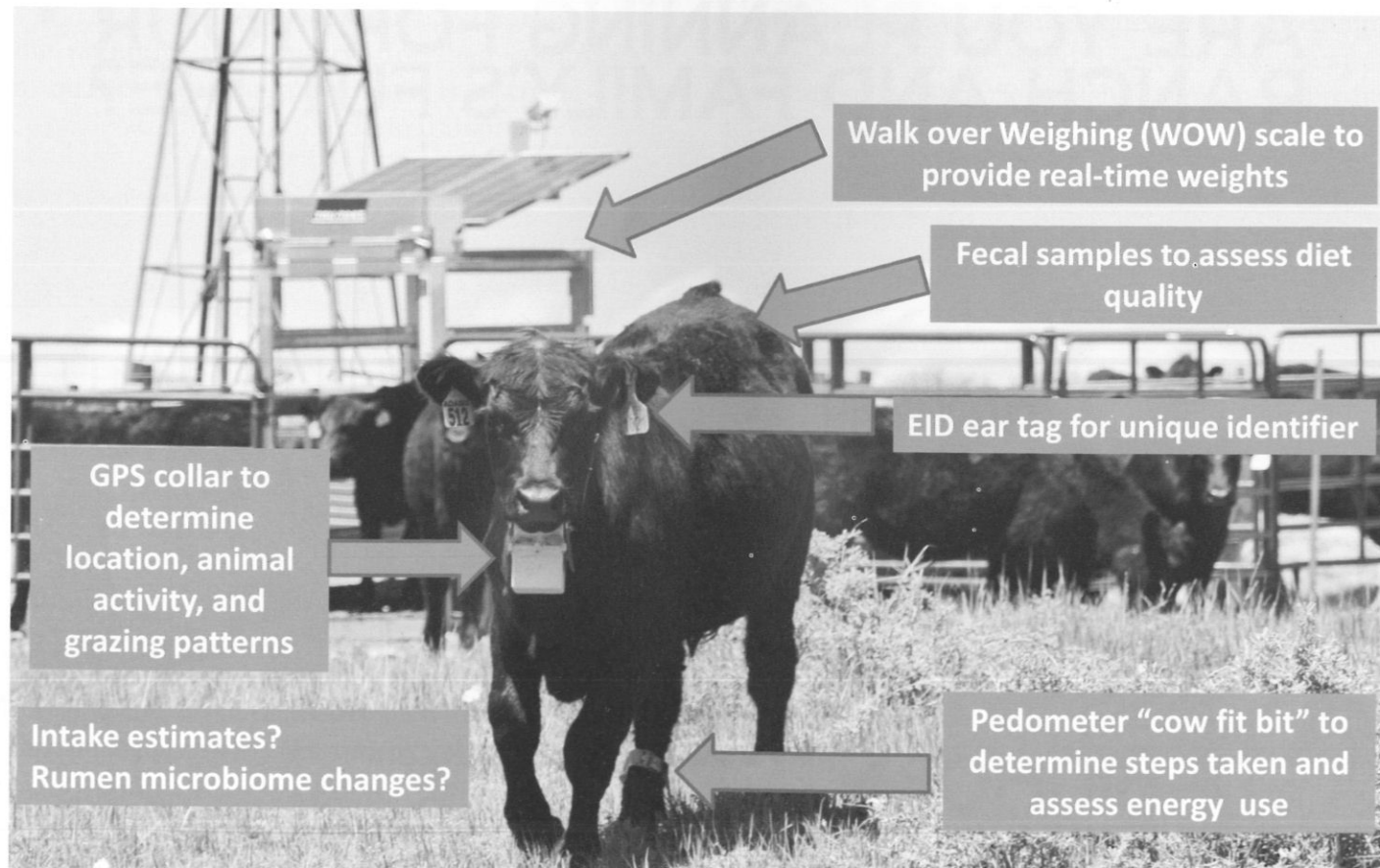


Photo by Melissa Johnston (USDA-ARS).

NE, location will be grown and finished under three combinations of E and M to determine whether, in this phase of the production cycle, differences in E and M alter the performance and meat quality of these cattle. Cattle will be randomized to the growing and finishing locations in such a way that insures the genetic diversity is well represented at each location. The three locations include Miles City, Clay Center, and El Reno and these locations will grow and finish cattle as is typical in their region. Miles City will graze the cattle on rangelands until January then bring them back into a feedlot in Montana to be finished. Clay Center will take the weaned calves straight to their feedlot in Nebraska to grow and finish the calves. El Reno will graze the cattle on wheat pasture until late spring before being moved to a feedlot in Oklahoma to be finished. Late next summer, all the cattle will be shipped to a common facility for harvest and to collect carcass data.

Second, a set of weaned calves from fall calving cows representing a couple major cattle breeds from the Clay Center location will stay at Clay Center and be backgrounded in a feedlot, or shipped in early May to Central Plains Experimental Range (Nunn, CO) and the Southern Plains Experimental Range (Woodward, OK). At the Central Plains Experimental Range, we will compare the Clay Center steers to those from a High-Altitude ranch (Colorado State University) and a local Colorado rancher’s home-raised steers during the grazing season (May to October). Averi Reynolds, who will be starting her M.S. project in Animal Science with Dr. Steve Paisley at the University of Wyoming, will be leading efforts to collect data to answer the following question: Do steers with different genetics and originating environments (south-eastern NE, high altitude mountains in CO, and local ranch-raised) exhibit differences in a) grazing behavior, b) diet quality, c) species grazed, d) use of pastures, e) forage intake, f) weight gains, and g) changes in rumen microbiome? Following the grazing season, these steers will be fed out in a feedlot at the Colorado State Uni-

versity ARDEC facility near Fort Collins, CO. Here the steers will be evaluated for a) weight gain, b) dry matter intake (DMI) using the GrowSafe system, and c) changes in rumen microbiome. The steers will be harvested the following spring and evaluated for a) carcass weight, b) fat thickness, c) rib eye area, d) tenderness, e) nutritional quality (Grand Forks, ND), and f) other carcass/animal attributes.

We would like your input on these studies. What questions would you like asked? Are we collecting measurements that are relevant to you? What have we missed that is important to you? Do you have predictions on what we will find? Please contact Justin Derner (Justin.Derner@ars.usda.gov) with your input.

Contributors to this article and the studies: Justin Derner and David Augustine (USDA-ARS, Cheyenne, WY and Fort Collins, CO); Mark Boggess, Tommy Wheeler, and Larry Kuehn (USDA-ARS, Clay Center, NE); Mark Petersen and Richard Waterman (USDA-ARS, Miles City, MT); Prasanna Gowda and Jim Neel (USDA-ARS, El Reno, OK); Stacey Gunter and Corey Moffet (USDA-ARS, Woodward, OK); Matthew Picklo, James Roemmich, Shannon Casperson, Lisa Jahns, and Zach Conrad (USDA-ARS, Grand Forks, ND); Jeff Vallet (USDA, National Program Leader for Food Animal Production); Steve Paisley and Averi Reynolds (University of Wyoming); Milt Thomas, Mark Enns and Scott Speidel (Colorado State University); William Pinchak (Texas A&M University). ☛

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Murphy Henriksen Wealth Management Group



STIFEL

Kevin Murphy
Senior Vice President/Investments
Branch Manager

Kyle Henriksen
First Vice President/Investments

Tracy Nyffeler
Registered Client Service Associate

Linda Kelly
Client Service Associate

(307) 232-9450

123 West First Street, Suite 500 | Casper, Wyoming 82601

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