



Enhancing Feed Efficiency in Beef Cattle

Efficient beef production is critical to food and economic security. Feed plays a key role in beef cattle performance. It is also a major cost for producers. As demand for beef rises, it is important to find ways to improve feed efficiency, or the ability of cattle to gain weight while consuming less feed. But measuring feed intake and feed efficiency is difficult.

Researchers at land-grant universities are working together to make breakthroughs in beef cattle feed efficiency.

With new information, biomarkers, models, and other tools, beef producers can optimize sire selection and feeding strategies to reduce feed use and costs while maintaining cattle health and performance. Improving feed efficiency could translate to higher farmer profits as well as more competitively priced products for consumers. In addition, optimizing feed will reduce the amount of nutrients released in cattle manure, which can impair soil and water quality.

A multistate, multidisciplinary approach is critical.

Support from the USDA National Institute of Food and Agriculture's Hatch Multistate capacity funding makes it possible for researchers from multiple institutions and disciplines to coordinate research on the wide variety of molecular, physiological, and genomic mechanisms that regulate beef cattle feed efficiency. Working together allows the exchange of research materials, data, tools, and techniques available at particular institutions and reduces redundant efforts. A strong integrated outreach component ensures findings and tools are shared with beef cattle producers across the country. This synergy drives national impact.

In recent years, this multistate project has conducted innovative research. For example, scientists:

- Measured post-weaning feed efficiency in young female cattle and looked at how it impacts later-life feed efficiency, productivity, and longevity. *South Dakota State University*
- Evaluated how residual feed intake efficiency affects beef steer response to dietary supplements. Results will guide sustainable use of microbial feed additives as alternatives to antibiotics—a key strategy to reducing antibiotic resistance in livestock. *West Virginia University*
- Collected data from over 1,200 replacement heifers in confinement and grazing settings and calibrated algorithms that predict dry matter and water intake with high accuracy. These models will help on-farm evaluation of feed and water efficiency. *West Virginia University*
- Showed how feeding behavior patterns, digestibility, and methane emissions vary among beef cattle with divergent residual feed intake. *Texas A&M University*
- Shed light on the feed use efficiency differences between beef and dairy cattle and beef x dairy crossbreeds. Results are informing better sire selection and management practices for more efficient beef production from the dairy industry. *Michigan State University*
- Measured the feeding behavior and determined the maintenance needs of individual and penned steers in beef finishing systems. *University of California, Davis*
- Shed light on genetic and metabolic factors that regulate the late fattening period in feedlot steers so biomarkers can be developed to guide precision management for cattle with specific beef quality grades. *Montana State University*
- Developed and validated new buccal sampling techniques, which not only improve the accuracy and efficiency of data collection but also reduce stress to animals during data collection. Widespread adoption of this technique could lead to more extensive and precise microbiome studies that reveal the complex interactions between cattle nutrition, microbial communities, and feed efficiency. *University of Tennessee*



To determine daily grazing feed intake for individual heifers, researchers use various tools, including virtual fence collars (top) and a mobile heifer unit (bottom) that provides real-time measurements of body weight and water intake. Photos by Matthew Wilson, West Virginia University.

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