

Improving Animal Performance by Manipulating Cattle Rumen Microbiomes

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UTIA Animal Science Ph.D. student Brooke Clemmons prepares samples for DNA quantitation. Photo Credit @RumenMicroLab.

Increasing feed efficiency continues to be a widespread topic among cattle producers and researchers across the country. In a recent review published in the journal *Microbial Ecology*, researchers at the University of Tennessee Institute of Agriculture (UTIA) discuss technological advances that ultimately will lead to the identification of cattle that are more feed-efficient and therefore help farmers reduce both feed costs and potential negative impacts on the environment.

Feed costs have been estimated to represent greater than half of the total cost of production in the beef cattle industry in the United States. In an effort to improve feed efficiency and thus reduce costs, researchers have studied methods for manipulating rumen microbes - microscopic organisms that live in the largest compartment of the stomach of ruminant animals such as cattle, sheep, and goats. Rumen microbes play a pivotal role in the breakdown and digestion of food, thus producing a significant source of energy for animals.

The rumen microbiome (total microbial communities present and the collective genomes of the microbes) is a complex ecosystem with many confounding factors that lead to its establishment and efficiency. Researchers have tried numerous ways of manipulating the rumen microbiome so that animals can more efficiently digest and absorb food, thereby requiring less feed and reducing costs for farmers, but they have yet to come up with a long-term practical solution.

Assistant professor Phillip R. Myer, associate professor Brynn H. Voy, and graduate research assistant Brooke A. Clemmons in the Department of Animal Science at UTIA examined recent technological advancements that are allowing for more comprehensive studies of the rumen microbiome which may lead to the identification of particular biomarkers (measurable indicators of a biological state) for increased feed efficiency. These feed efficiency biomarkers could ultimately be a selection criterion when farmers purchase animals.

“Our research is focused on understanding the mechanisms involved with establishing or re-establishing a favorable rumen microbiome which will provide persistent, long-lasting changes that increase animal production and feed efficiency,” Phillip R. Myer said.

The current state of research suggests that further study is likely to result in the identification of biomarkers for increased feed efficiency in ruminant animals. **For Tennessee producers, this**

could lead to the selection of more feed efficient animals, which should translate into fewer feed input costs, greater protein production, and big savings.

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Reference:

Clemmons, B.A., Voy, B.H. & Myer, P.R. Microb Ecol (2018). <https://doi.org/10.1007/s00248-018-1234-9>.

<https://rdcu.be/3ksa>

Further Information:

For more information on rumen and lower gut microorganisms and their impact on the ruminant’s performance and health, visit <https://rumenmicrobes.utk.edu>.

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