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Understanding enteric methane sources and quantification improves mitigation strategies in grazing beef systems

Methane sources, quantification, and mitigation techniques target reductions in enteric methane emissions of the beef industry according to an invited review in *Applied Animal Science*

Philadelphia, PA, August 10, 2020—Enteric methane, a potent greenhouse gas, is a natural by-product of grazing livestock that is produced by the ruminant digestive system and released into the atmosphere. A deeper understanding of the mitigation strategies in grazing systems aids in reducing the agricultural sector's emission footprint. Researchers from Michigan State University surveyed and evaluated the peer-reviewed literature to further our understanding of enteric methane emission sources, quantification methods, and mitigation strategies. Their findings appear in the August issue of *Applied Animal Science*.

During ruminal fermentation, volatile fatty acids are produced and used for metabolic processes. Subsequently, the carbon dioxide and hydrogen produced in these processes are converted to methane and expelled into the environment as a greenhouse gas emission. There is potential to reduce these emissions by improving forage quality and nutritional status of the animal. "Methane mitigation strategies in grazing environments are limited, but producer decisions that improve the nutritional status of animals, the quality of the forage base, and supplementation of known methane-mitigation compounds can reduce methane production," said author Jason E. Rowntree, PhD, Department of Animal Science, Michigan State University, East Lansing, MI, USA. Strategies to improve forage quality by including cool-season forages and legumes, rotational grazing of animals, and including forages with beneficial secondary compounds show promise in reducing emissions. Additionally, there is potential for genetic selection of cattle, lipid supplementation, and soil methanotrophy to offset emissions.

Quantification methods that adequately measure emissions at the farm-scale are important to provide insights on how management practices and environment affect those emissions. The respiration chamber and head-box methods produce precise and accurate estimates of gas production but do not reflect a normal production environment. The GreenFeed emission measurement system and portable accumulation chambers rely on spot sampling; GreenFeed requires longer sampling periods for accuracy than portable accumulation chambers. Newer meteorological techniques can estimate herd-scale emissions, giving researchers a better understanding of the effects of mitigation strategies on a farm scale.

Enteric methane production is a natural part of rumen metabolism, but producers' choices can reduce emissions while improving the nutritional status of the animal. "Now that less expensive, easier-to-use quantification tools exist, researchers need to conduct more long-term monitoring experiments and focus on reducing methane production of grazing animals where potential for reduction is largest," said coauthor Logan Thompson, PhD candidate working with Dr. Rowntree.

"This extensive review examines sources, pathways and quantification of methane emissions in grazing beef cattle systems. With that background, key mitigation strategies to reduce enteric methane and improve efficiency of energy utilization are discussed," added David K. Beede, editor in chief of the journal.

The review appears in the August issue of *Applied Animal Science*.

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Notes for Editors

"*Invited Review:* Methane sources, quantification, and mitigation in grazing beef systems," by L. R. Thompson and J. E. Rowntree (DOI: https://doi.org/10.15232/aas.2019-01951), *Applied Animal Science*, Volume 36, Issue 4 (August 2020), published by FASS Inc. and Elsevier Inc.

Full text of the article is available to credentialed journalists upon request; contact Brittany Morstatter at +1-217-356-3182 ext. 143 or arpas@assochq.org to obtain copies. To schedule an interview with the authors, please contact Jason Rowntree, PhD, at rowntre1@anr.msu.edu.

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