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# Expanding the sustainability and efficiency of forage-based beef production with the use of genetic decision tools

*Increasing cow efficiency and decreasing emissions through the use of current and developing selection tools is discussed in a recent review in* Applied Animal Science

**Champaign, IL, December 27, 2022**—Much research goes into discovering management strategies for the beef industry that increase environmentally sustainability. “Forage-Based Beef Management Tools and Their Impacts on Environmental Sustainability” was the topic of the January 2022 Bill E. Kunkle Interdisciplinary Beef Symposium, and articles that resulted from presentations at the symposium appear in the December issue of *Applied Animal Science*.

One of the invited reviews from the symposium focuses on how genetic selection tools can be used by beef producers to increase efficiency and environmental sustainability in the cow-calf sector. The author, from the University of Tennessee Institute of Agriculture, reviews the complexities of cow efficiency, currently available genetic decision tools, and developing technologies. David K. Beede, PhD, Editor in Chief of *Applied Animal Science*, said, “This invited review addresses challenges and opportunities for future forage-based beef cow-calf systems to develop and implement genetic selection to excel in overall system efficiency (biological and economic) in a warming and increasingly volatile climate.”

“Cow-calf production is responsible for most of the beef sector’s greenhouse gas emissions,” said the author, Troy N. Rowan, PhD, Department of Animal Science and Department of Large Animal Clinical Sciences, University of Tennessee Institute of Agriculture, Knoxville, TN, USA. He added that brood cows’ emissions of greenhouse gases over their lifetime are much larger compared with that of animals in the finishing phase. Cows live and emit for more years, and their forage-based diet results in more emissions compared with the diet of animals fed a concentrate-based diet for a shorter period of time. Therefore, this review focuses on cow efficiency, discussing in detail the many traits that can lead to improved metabolic, feed, production, and economic efficiencies. “Greenhouse gas emissions are favorably correlated, phenotypically and genetically, with feed efficiency,” said Rowan. This enables beef producers to make breeding selection decisions that both promote efficiency and reduce emissions.

Caption: Genetic decision tools can be used to increase the sustainability and efficiency of cow-calf production (Credit: T. Rowan).

The article reviews the many currently available genetic selection tools, such as genomically enhanced estimated breeding values, genetic predictions, genotype-by-environment interactions, and adaptive phenotypes, that can be considered when selecting bulls that will sire more efficient and environmentally adapted daughters. Rowan added, “For improving cow efficiency, sustainability, and adaptability, selection indexes will continue to be critical tools for balancing multiple traits of varying importance that are genetically correlated with one another.” The article also discusses how developing technologies such as sensors, cameras, and machine learning can be used to measure and predict novel phenotypes in the future. “Novel phenotype development will require cross-disciplinary academic collaborations among geneticists, nutritionists, physiologists, statisticians, data scientists, engineers, and others,” said Rowan. The review demonstrates that current and developing genetic tools can be used to increase the efficiency and sustainability of forage-based cow-calf production.

The article appears in the December issues of *Applied Animal Science*.

The other article that resulted from a presentation given at the Bill E. Kunkle Interdisciplinary Beef Symposium, “Forage-Based Beef Management Tools and Their Impacts on Environmental Sustainability,” Southern Section of the ASAS annual meeting, Ft. Worth, TX, January 2022, is as follows:

> “Invited Review: Ecosystem services provided by grasslands in the Southeast United States,” by J. C. B. Dubeux Jr., D. Jaramillo, E. R. S. Santos, L. Garcia, and L. D. Queiroz. 2022. Appl. Anim. Sci. 38(6). https://doi.org/10.15232/aas.2022-02296.

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**Notes for editors**

“Invited Review: Genetic decision tools for increasing cow efficiency and sustainability in forage-based beef systems,” by T. N. Rowan (https://doi.org/10.15232/aas.2022-02306), *Applied Animal Science*, volume 38, issue 6 (December 2022), published by Fass Inc. and Elsevier.

This article is openly available at https://doi.org/10.15232/aas.2022-02306.

Full text of the article is also 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 author(s), please contact Troy N. Rowan at trowan@utk.edu.

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