



OPEN ACCESS

EDITED AND REVIEWED BY
Maria Pilar Bernal,
Spanish National Research Council
(CSIC), Spain

*CORRESPONDENCE
Arif Reza
✉ arif.reza@stonybrook.edu

RECEIVED 26 March 2024
ACCEPTED 03 April 2024
PUBLISHED 19 April 2024

CITATION
Reza A, Toor UA and Shim S (2024) Editorial:
Advanced and innovative livestock waste
treatment technologies for agricultural
sustainability.
Front. Sustain. Food Syst. 8:1407083.
doi: 10.3389/fsufs.2024.1407083

COPYRIGHT
© 2024 Reza, Toor and Shim. This is an
open-access article distributed under the
terms of the [Creative Commons Attribution
License \(CC BY\)](#). The use, distribution or
reproduction in other forums is permitted,
provided the original author(s) and the
copyright owner(s) are credited and that the
original publication in this journal is cited, in
accordance with accepted academic practice.
No use, distribution or reproduction is
permitted which does not comply with these
terms.

Editorial: Advanced and innovative livestock waste treatment technologies for agricultural sustainability

Arif Reza^{1,2*}, Umair Ali Toor³ and Soomin Shim⁴

¹New York State Center for Clean Water Technology, Stony Brook University, Stony Brook, NY, United States, ²School of Marine and Atmospheric Sciences, Stony Brook University, Stony Brook, NY, United States, ³Center for Desert Agriculture, King Abdullah University of Science and Technology, Makkah, Saudi Arabia, ⁴Department of Animal Industry Convergence, College of Animal Life Sciences, Kangwon National University, Chuncheon, Republic of Korea

KEYWORDS

livestock waste management, agricultural sustainability, livestock farming practices, environmental impact, novel treatment approaches

Editorial on the Research Topic

[Advanced and innovative livestock waste treatment technologies for agricultural sustainability](#)

Introduction

The efficient and eco-friendly management of livestock waste is crucial to agricultural sustainability. Livestock farming is an integral part of the global food production system. While essential for meeting the growing demand for meat and dairy products, substantial amounts of waste are generated from livestock production systems that can have far-reaching ecological consequences if not appropriately managed. Livestock waste, encompassing manure and other byproducts, poses challenges related to greenhouse gas emissions, nutrient runoff, and the potential contamination of soil and water resources. Addressing these issues is not only pivotal for environmental stewardship but is also integral to the resilience and sustainability of agricultural systems worldwide. Hence, this Research Topic focuses on exploring novel approaches and technologies to mitigate the environmental impact of livestock farming practices while enhancing overall agricultural sustainability.

Manuscript highlights

The manuscripts published under this Research Topic collectively represent a comprehensive exploration of advanced technologies and innovative strategies that hold promise for sustainable livestock waste management.

[Ramin et al.](#) explore a novel approach to mitigate methane emissions from stored feces of dairy cows. Methane is a potent greenhouse gas, and its reduction is essential for mitigating climate change. The use of *Asparagopsis taxiformis*, a red seaweed known for its methane-reducing properties, presents an innovative and sustainable solution. This research not only contributes to greenhouse gas reduction but also highlights the potential of harnessing natural resources to address environmental challenges in agriculture.

[Asgar et al.](#) focus on the optimization of a sequencing batch reactor for the simultaneous removal of phosphorus and nitrogen from anaerobically digested liquid dairy manure. Nutrient management is a critical aspect of livestock waste treatment, and this research offers a practical solution to enhance the efficiency of nutrient removal processes. The outcomes of this study have implications for sustainable agriculture by reducing the environmental impact of nutrient runoff.

[Reichenbach et al.](#) investigate the changes in enteric methane emissions across different dairy production systems in the urbanizing environment of an Indian megacity. By examining variations across different dairy production systems located in the rural-urban interface, the researchers elucidate the factors influencing methane emissions. This study is crucial in understanding the dynamic interaction among urbanization, livestock farming, and environmental impact, offering insights that can inform sustainable practices in rapidly developing regions.

[Deviney et al.](#) present a comprehensive case study that examines the complexities of swine waste management in the context of North Carolina's agricultural system. By adopting a holistic approach, the study identifies pathways for sustainable transitions, highlighting the need for integrated and adaptive solutions. This work serves as a valuable resource for policymakers, researchers, and stakeholders seeking to navigate the challenges of large-scale livestock waste management within diverse agricultural systems.

Conclusion

The diverse range of research presented in this Research Topic reflects the unique challenges associated with livestock waste management and opportunities for innovation. From innovative seaweed applications to complex case studies and advanced wastewater treatment technologies, each manuscript contributes valuable knowledge to the broader discourse on sustainable farming practices. The insights gained from these studies not only broaden the scientific and technical comprehension regarding livestock

waste management but also offer practical solutions that can be implemented to enhance the overall sustainability of the agricultural sector.

Author contributions

AR: Writing – original draft, Writing – review & editing. UT: Writing – original draft, Writing – review & editing. SS: Writing – original draft, Writing – review & editing.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

Acknowledgments

We would like to thank all the contributors and peer reviewers.

Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

Publisher's note

All claims expressed in this article are solely those of the authors and do not necessarily represent those of their affiliated organizations, or those of the publisher, the editors and the reviewers. Any product that may be evaluated in this article, or claim that may be made by its manufacturer, is not guaranteed or endorsed by the publisher.