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This Reprint brings together recent advances in ruminant science that address the role of ruminant animals in contemporary food systems, with a particular emphasis on efficiency, sustainability, and resource use. Ruminants uniquely convert non-human-edible biomass, such as pastures, rangelands, and agricultural by-products, into high-quality food for humans, positioning them as key components of resilient and circular agricultural systems. The studies compiled in this Reprint examine how different dietary strategies, feed resources, and production systems influence the conversion of energy and protein into meat and milk, as well as their environmental implications. Contributions span nutrition, physiology, production systems, and sustainability assessments, providing integrated perspectives on how ruminant feeding practices affect productivity, nutrient use efficiency, and emissions. By highlighting both biological mechanisms and system-level outcomes, this Reprint advances our understanding of how ruminant animals can contribute to sustainable food production under diverse agroecological and socioeconomic conditions. This collection is intended to support researchers, educators, and professionals seeking evidence-based insights into the optimization of ruminant production systems and their role in future agri-food systems.



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