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Editorial: Sustainable food consumption and production in the 21st century

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Editorial on the Research Topic

Sustainable food consumption and production in the 21st century

The Research Topic “*Sustainable food consumption and production in the 21st century*” addressed issues of paramount importance within the field of food systems. Globally, food waste represents a major concern, occurring simultaneously with widespread malnutrition. Food production practices exert excessive pressure on natural resources such as water and land, while growing demand for animal products compounds environmental challenges. In the face of population expansion and an increasingly volatile climate, existing food production and consumption patterns proved unsustainable. The need for solutions addressing systemic sustainability weaknesses within global food systems was undeniable. This Research Topic served as a valuable forum for exploration, presenting 21 diverse contributions, including original research, reviews, and opinion pieces. The curated Research Topic sought to confront the complex challenges and identify potential solutions within the domain of sustainable food systems, demonstrating a holistic approach essential for understanding and addressing these critical issues affecting humanity worldwide.

Technological advancements have emerged as a driving force in transforming agricultural practices toward sustainability, enabling data-driven approaches that enhance production efficiency and environmental stewardship across diverse systems. Qi et al. demonstrate the role of digital technology in combating productivity losses by facilitating precise monitoring and timely actions that are essential within intensive dairy operations. The significance of verifiable sustainability practices gains prominence in Sarwar et al.’s exploration of an online platform, designed to create efficiencies in demonstrating environmental stewardship for Australian beef producers. Yuan et al. show how an Integrated Water-Fertilizer System promotes more judicious resource use among cotton growers. Further, their work illustrates a clear benefit of utilizing technological advances to quantify fertilizer use efficiency, thereby driving greater sustainability within the sector. These contributions point to the power of innovative technologies in supporting robust, evidence-based sustainable agriculture.

Enhancing sustainable food consumption requires a deep understanding of consumer behavior and the development of strategies to influence their choices toward environmentally responsible and ethical dietary practices. [Chen et al.](#)'s exploration of vegetarianism among Chinese urban and rural tourists reveals both a greater openness to plant-based diets and the complexities of navigating perceptions when adopting such choices. This aligns with [Erfanian et al.](#)'s analysis of plant-based meat acceptance, indicating that taste, perceived nutritional value, and texture have primary influence, suggesting avenues for tailoring product development and marketing. [Xiao et al.](#)'s focus on "ugly" produce presents a compelling counterpoint, indicating potential shifts in consumer attitudes around visual standards, as "naturalness" cues appear to mitigate negative bias in a potentially waste-reducing shift. Collectively, these studies reveal the interaction between internal motivations, product and marketing factors, and visual standards as important factors in sustainable food choices. This highlights the need for diverse communication and product strategies across a range of sustainable alternatives.

To achieve sustainability in food systems, it is imperative to adopt a comprehensive understanding of the environmental impact associated with both production and consumption practices, encompassing all aspects of their ecological footprint. A holistic understanding of the environmental impact of food production and consumption is essential for fostering sustainability. [Hatjiathanassiadou et al.](#)'s review emphasize the critical role of environmental footprinting tools, including carbon, water, and land-use metrics, when evaluating the sustainability of diets. Applying this rigorous assessment approach, [Sameshima et al.](#)'s examination of Japanese meals provides insights into the role of dietary choices in greenhouse gas emissions, highlighting the significance of protein sources. [Ma et al.](#)'s analysis of China's maize industry underscores the complexities of assessing sustainability, demonstrating the importance of including carbon emissions within productivity models. These studies advocate for incorporating comprehensive, standardized environmental measurements into policy making and decision support, informing dietary shifts and the promotion of sustainable agricultural practices with minimal ecological impact.

Achieving food security through sustainable practices demands proactive, data-driven approaches that anticipate future challenges and develop evidence-based strategies to address them effectively. [Mottaleb et al.](#)'s rigorous projections of growing wheat demand in China and India spotlight the crucial interplay between population dynamics and sustainable resource management, with clear implications for future food system planning. [Waseem et al.](#)'s exploration in Pakistan provides critical evidence linking crop and livestock diversification to improvements in food quality and access, informing region-specific policy responses. [Haq et al.](#)'s work highlights a strong linkage between sustainable climate change adaptation at the household level and gains in food security, underscoring the necessity of policies that integrate these factors. Overall, these studies emphasize the importance of evidence-based decision-making, context-specific solutions, and anticipatory actions for navigating complex future food security challenges within a sustainable framework.

Realizing sustainability goals within food production systems requires a strategic approach that involves the development of context-specific frameworks and the promotion of collaborative actions among various stakeholders, acknowledging the diverse challenges and opportunities across different settings. [Zhang and Zhu](#)'s findings reveal the benefits of market-oriented cooperation in bolstering the technical efficiency of smallholder farms in China, highlighting the significance of targeted cooperation for smaller operators. Turning to short food supply chains (SFSCs), [Balcom et al.](#)'s investigation of practices in Atlantic Canada demonstrates a commitment to environmental responsibility and economic viability within local systems. Conversely, [Su et al.](#)'s emphasis on developing robust, standardized systems to address online food markets reveal the critical role of policies in managing consumer protection and safeguarding quality, underscoring the distinct complexities posed by online sales channels. The studies provide evidence for leveraging various collaborative approaches alongside targeted policymaking to overcome challenges and ensure sustainability across diverse food production and distribution channels.

Strategic resource management underpins sustainable growth within the agricultural sector. [Dayananda et al.](#)'s work on village tank cascade systems highlights the critical role of water as a key limiting resource, requiring careful water-management systems and drought-resistant practices, especially in dry zones. In the Chinese context, [Ye et al.](#)'s investigation demonstrates that strategic integration of rural economies promotes agricultural total factor productivity. Their findings provide an understanding of how integrated development models contribute to enhanced efficiency and improved yields for sustainable food production. Both studies advocate for adopting systemic approaches to maximize sustainability, with interventions addressing both resource constraints and the broader rural sector.

Policy interventions in support of sustainable food systems demand evidence-based decision-making and multifaceted efforts aimed at understanding consumer behavior. [Nikravech](#)'s call for rigorous experimental designs emphasizes the need for reliable data that can accurately measure the impact of food waste policies. [Seymour](#)'s opinion piece advocates for expanding the definition of sustainable agriculture to incorporate animal-free organic practices, offering an inclusive approach to addressing food security. [Schäfer and Haack](#) underscore the challenge of overcoming established, efficiency-oriented systems in food service transitions, requiring interventions that span different governance levels. The rise of online food markets, as noted by [Su et al.](#) creates opportunities for transparency and quality control, necessitating policy interventions to create standardized systems. Lastly, [Shahbaz et al.](#)'s work emphasizes the significance of empowering female farmers and promoting innovation for responsible agriculture practices. Combined, these studies emphasize the interconnectedness of informed policy-making, inclusive practices, and targeted interventions targeting the behavior of both producers and consumers to foster sustainable change.

The breadth of research examined in this Research Topic demonstrates the inherent complexity of sustainable food systems and the necessity of adopting multi-pronged, systems-level

responses. Technology provides strategic solutions to resource management and productivity gains, while consumer research yields critical information to design both products and policies that encourage sustainable demand. From the granular view of village systems to national-level projections, the importance of integrating a wide range of scales—both geographic and temporal—for both analysis and future planning is self-evident. This diverse body of work reinforces the necessity of ongoing research tailored to both local realities and overarching environmental pressures. Through collaboration, evidence-based interventions, and an steadfast commitment to sustainability, it is possible to reshape food systems, achieving nutritional wellbeing while preserving the integrity of our planet for generations to come.

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