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EDITED AND REVIEWED BY
José Antonio Teixeira,
University of Minho, Portugal

*CORRESPONDENCE
Chunhong Yuan
✉ chyuan@iwate-u.ac.jp

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Editorial: Transdisciplinary communication for sustainable food systems

Shugo Watabe[1], Yaqin Hu[2], Hayato Maeda[3] and Chunhong Yuan[4]*

[1]School of Marine Biosciences, Kitasato University, Sagamihara, Japan, [2]School of Food Science and Engineering, Hainan Tropical Ocean University, Sanya, China, [3]Faculty of Agriculture and Life Science, Hirosaki University, Hirosaki, Japan, [4]Faculty of Agriculture, Iwate University, Morioka, Japan

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Editorial on the Research Topic
Transdisciplinary communication for sustainable food systems

The global food system is at a critical juncture, facing unprecedented challenges such as a growing world population and extreme weather events. These factors have led to increased food demand, which impacts food availability and health as well as nutritional value and agricultural productivity. The Research Topic "*Sustainable Food Systems*" aims to address these challenges by collecting articles related to the 10th East Asia Free Trade Agreement (EAFTA) 2023, an international symposium held in Morioka, Japan. The global food system needs to be appropriately upgraded and adapted to meet said challenges and maintain sustainability in response to changes in socio-economic, ecological, and human needs. Currently, the sustainability of food systems applies to the entire cycle of food processing production, and consumption: raw materials, production, processing, packaging, transportation, consumption, and recycling, from suppliers to consumers, from agricultural production to ecological environment. This also takes into account the differences in cultural propensity, nutritional status, consumption structures, supply demands, and natural resources in various countries and regions. Therefore, the study of sustainable food systems has evolved into a comprehensive and in-depth understanding of the framework, characteristics, and development of sustainable food systems from multiple perspectives, including agriculture, food, nutrition and health, the supply chain, and ecology, taking into full account the social, economic, and cultural influences. This Research Topic aims to address the major scientific issues and challenges related to food in the field of global change around sustainable food systems, to bring together multidisciplinary innovations, experiences, and achievements through transdisciplinary, interdisciplinary, and transboundary exchanges, to provide a platform for exchange and cooperation in the transformation, development, and research of food systems, and to promote the sustainable development of global food systems jointly.

This editorial synthesizes findings from several studies that contribute to our understanding of sustainable food systems, focusing on the annual variation in thermal and structural properties of yesso scallops, the potential of visual features in predicting material attributes in wakame, consumer preferences for marlin sashimi, the microbiological safety of butchery-sold meat in Nairobi, Kenya, recent studies on microplastic contamination in

beverages, the development of cultivated meat, and the quality dynamics of Indonesian vanilla, highlighting the multifaceted nature of sustainable food systems.

Annual variation in yesso scallops

Tian et al. investigated the annual changes in the scallop's adductor muscle in terms of Ca^{2+}-ATPase activity, chymotryptic digestion, endogenous fluorescence spectra, sulfhydryl content, and surface hydrophobicity. The results showed that Ca^{2+}-ATPase activity peaked in February and reached its minimum in August for males and in July for females. However, no significant differences were observed between males and females throughout the year. The inactivation rate of Ca^{2+}-ATPase activity increased 17- to 36-fold when the temperature rose from 38°C to 45°C. The ratio of free myosin to bound myosin was approximately 5:4 at 0.5 M KCl and changed to 5:1 at 1.0 M KCl. Chymotryptic digestion demonstrated that scallop myosin could be cleaved into S-1/rod portions at 0.1 M and HMM/LMM at 0.5 M KCl. Furthermore, no significant seasonal variations were observed in chymotryptic digestion patterns, endogenous fluorescence, surface hydrophobicity, or sulfhydryl content. In conclusion, the structure and thermal stability of both male and female scallops remained stable throughout the year, making them suitable for processing and preservation.

Visual identification of material attributes in wakame

Lu et al. explored the potential of using visual features to predict key material attributes in wakame, focusing on thickness, strength, and chlorophyll content (SPAD values). The study compared frozen and salted wakame samples to understand how different processing methods affect these predictions. Using a combination of RGB, Lab*, and HSV color features, various regression models were developed and evaluated. The results indicated that color features could effectively predict SPAD values, particularly in frozen samples, with the best models achieving an R^2 of 0.900. However, predicting thickness and strength proved more challenging, with models showing limited predictive power. Interestingly, strength predictions were more accurate for salted samples, suggesting that salt curing may enhance the relationship between visual features and physical strength. The study contributes to the development of rapid, non-destructive methods for assessing wakame quality, which is crucial for the growing wakame industry.

Consumer preferences for marlin sashimi

Hashimoto et al. focused on the sensory properties of marlin (*Kajikia audax*) sashimi, specifically the impact of lipid content on consumer preference. The study compared lipid contents and fatty acid compositions of different individual sizes and body parts of marlin. The preference for overall, taste, texture, odor, aftertaste, and lipid content in marlin sashimi taken from different parts of the body with different amounts of lipids was investigated using the paired preference method. The results showed that the lipid content preference for the anterior dorsal part (high lipid part) was higher than that for the posterior dorsal part (lower lipid part). However, no difference in overall preference was observed. The study suggests that lipid content is associated with the preference for marlin sashimi and can be classified into two groups: those who prefer high-lipid sashimi and those who prefer low-lipid sashimi.

Microbiological safety of butchery-sold meat in Nairobi

Koech et al. assessed the microbiological safety and handling practices of meat sold in selected butcheries in Nairobi, Kenya. The study found that a significant proportion of the meat samples had *E. coli* and total coliforms above the acceptable regulatory limits. Enterobacteriaceae resistant to tetracycline and cefotaxime were detected in 35% and 9.5% of the samples, respectively. Poor meat handling practices were observed among the butcher shop attendants, posing an increased risk of foodborne illness to consumers. The study underscores the urgent need for education of butcher shop attendants on the appropriate handling of meat and the enforcement of existing regulations.

Indonesian vanilla: from bean to market

The Indonesian vanilla industry is a prime example of the delicate balance between quality, safety, and sustainability. A recent study by Munarso et al. explored the chemical and production dynamics of high-quality Indonesian vanilla, identifying the chemical composition, production constraints, and post-harvest practices that impact vanilla quality. The research found that Indonesian vanilla products meet national standards, with vanillin content ranging from 1.21 to 3.50%. However, the practice of early harvesting due to theft risks leads to a drop in quality, particularly in vanillin concentration. Sustainable growth, stakeholder involvement, and inclusive business models are essential to navigate these challenges and enhance the industry's commitment to quality.

Cultivated meat: toward an innovation radar

Cultivated meat has garnered growing attention for its potential to be produced more ethically and sustainably than current meat production methods. However, there are still major challenges to be overcome to reach industrial production levels. A study by Woelken et al. proposes an innovation radar for cultivated meat, identifying different technological solutions and their expected contributions to social inclusion in food systems. The results indicate that while technological innovations in cell line development, scaffolding, growth media, and bioprocess have the potential to impact inclusion in the consumption of cultivated

meat, there are also concerns about cognitive, cultural, and regulatory barriers.

Microplastics in beverages: a growing concern

The widespread use of plastics in beverage packaging has led to the accumulation of microplastics (MPs) and nanoplastics (NPs) in beverages, posing significant environmental and health hazards. A review article by Ma et al. discusses the sources, entry pathways, and risk factors of MPs and NPs in beverages, emphasizing their toxicological profiles and harmful effects on human health and the environment. The article also highlights the need for standardized testing protocols and future solution strategies, including advanced filtration systems and the development of alternative packaging materials.

Conclusion

This editorial highlights several studies that emphasize the complexity of ensuring food safety, promoting innovation, and fostering sustainability in food systems. It stresses the need for a holistic approach that integrates scientific, social, and policy considerations and points to the importance of education, regulation, and stakeholder engagement.

A systems thinking approach is crucial to understanding the interconnectedness of food system components, where solutions to one issue may have unintended consequences elsewhere. The adoption of new technologies in meat production or cultivated proteins must be accompanied by measures to ensure social acceptance and regulatory compliance. Similarly, preserving traditional food systems, such as Indonesia's vanilla industry, requires balancing modernization with cultural and ecological integrity.

In conclusion, while the path to a sustainable food future is challenging, it also presents significant opportunities. The research provides valuable insights, but it is through interdisciplinary collaboration that we can transform food systems. This approach fosters innovation, improves food safety, and promotes a more sustainable, resilient, and equitable food system.

Author contributions

CY: Conceptualization, Writing – original draft, Writing – review & editing. SW: Writing – original draft, Writing – review & editing. YH: Conceptualization, Writing – original draft, Writing – review & editing. HM: Writing – original draft, Writing – review & editing.

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.

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