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# From Farm to Flush: Innovation within Global Food Systems

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Guest Editors

In the early days, cereal scientists mainly focused on food product design and processing. The food chain, however, extends beyond these functions: cereal scientists must look upstream to breeding, agronomy, farming, storage, and raw material transportation systems, as well as downstream to food production, distribution, and consumption. They must integrate human nutrition, environmental sustainability, climate change, hunger, and waste factors into their approaches. Cereal scientists can no longer address their technical questions in isolation.

During a recent knowledge-transfer mission to Africa with Kansas State University, Maureen observed firsthand that the scientific questions encountered are surrounded by sociopolitical issues that are often equal in importance to the technical challenges. Overcoming technical challenges will require an understanding of cultural, political, and environmental situations in order for solutions to be successful and sustainable. Collaboration up and down the food chain can help cereal scientists crack the code on future innovation. This might mean reaching out to colleagues in various areas of scientific and creative endeavors, which could include the social sciences (e.g., political science, economics, anthropology, psychology, sociology, urban development), as well as fundamental and applied sciences (e.g., nutrition, engineering, chemistry, physics, logistics, and agriculture).

Consumer wellness demands continue to evolve and shape food innovation around the world. Some of their demands (e.g., gluten-free, GMO-free, paleo, vegan, organic, and clean-label foods) may have a scientific basis, carry social responsibility overtones, or be an emotional response to media reports. During the 2017 AACCI Annual Meeting, keynote speaker Linda Eatherton described how self-declared “food evangelists” are capturing consumers’ hearts and minds and perpetuating unsubstantiated beliefs. Unfortunately, some consumers trust these evangelists more than health and nutrition experts. Maureen observed this phenomenon first hand when visiting Africa. “Even though Ethiopia is very impoverished, many had smart phones and were engaged in social media.” She was stunned when an educated plant manager told her that he was converting the entire plant to gluten-free manufacturing because he’d learned on social media that it was healthier for consumers. Cereal scientists must innovate within the context of health, safety, and sustainability, with constant consideration of consumers’ knowledge and information sources.

Specialized knowledge and skills in cereal science, along with collaboration across geographic and disciplinary boundaries, will enable cereal scientists to lead innovation within the broader global food system. Two of the feature articles in this issue share specific collaboration models: “Kansas State University’s Collaborative Approach to Research through Global Food Systems” and “Collaboration between Academia and Industry: KU Leuven.” The first describes a program that integrates interdepartmental and external partnerships with other academic, government, and industry entities to solve global food challenges (K-State Global Food Systems). The second explores the opportunities and challenges of the Triple Helix model for collaboration among academia, industry, and government (KU Leuven). The Institutional Profile on EIT Food describes an integrated framework that is being used to connect businesses, research centers, universities, and consumers in Europe.

This issue also includes feature articles that look “back to the future” for innovation. “Perennial Cereals Provide Ecosystem Benefits” explores how cereal scientists can learn from ancient systems in cultivating perennial wheatgrass to reduce the environmental impact of growing wheat as an annual crop. “3D-Printed Cereal Foods” examines how new additive manufacturing technologies (3D printing) can be applied to food production to enhance functionality, improve nutrition, enable personalization, reduce waste, and deliver other consumer benefits.

The analytical quality of research is of utmost importance, and continuing optimization of current methods and development of new methods is crucial for further innovations. This is also exemplified in this issue in the report, “AACC International Approved Methods Technical Committee Report: Collaborative Study on Measurement of Crumb Structure of Baked Products by C-Cell for AACCI Method 10-18.01.”

The November-December columns reflect how any innovation must be developed with the consumer in mind. “What’s Next for Southern Flavors” inspires product developers to consider new flavors and textures that appeal to today’s consumer. Consumers not only want their foods to taste good, they expect foods to deliver health and wellness benefits. “Practical Approaches to Healthy Baking” addresses fundamental considerations when formulating baked products with health benefits.

Cereal scientists are contributors to the larger global food system that feeds the Earth’s population. A multitude of geopolitical forces shape how food is grown and distributed around the globe. Innovating in a global food system involves integrating agronomy, product design, food production, and human nutrition, as well as how food consumption waste is “flushed” back to the planet. Cereal scientists cannot operate alone: collaboration across geographic and disciplinary boundaries has become a critical skill in successfully navigating the complexities required for future innovation.