

Introducing the Food Engineering, Expansion and Development (FEED) Institute

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The food industry is rapidly expanding, both in existing and nascent markets. Global food retail sales now generate more than \$4 trillion per year. Food is also one of the most popular industries for entrepreneurs, especially in emerging markets such as alternative protein, food additives, fermentation, and more. Historically, chemical engineers have played a role in the food industry, such as contributing to advances in fertilizers and pesticides, processing and packaging designs, and equipment sterilization techniques. Chemical engineers bring a wealth of knowledge to this industry that can help to accelerate the development of new technologies and solve some of its grand challenges.

Digitalization in the food industry. Food engineers and scientists are implementing new technologies to revolutionize the industry, optimize manufacturing processes, and improve sustainability across the supply chain. The advent of digitalization, including the adoption of digital technologies such as artificial intelligence (AI), the Internet of Things (IoT), big data, and digital twins, is changing the way engineers design and operate manufacturing processes. These digital technologies enable cost reductions and efficiency improvements of food production, which help to meet the growing demand for food.

Big data is especially important to quality control, as IoT-driven sensors can transfer data rapidly, which gives companies the ability to monitor the entire supply chain. The transfer of information can enable the replacement of damaged products and the detection of issues in real time, allowing preventive action. Digital twins allow food and beverage manufacturers to model their processes in a virtual environment, giving engineers the virtual tools to alter various aspects of the process in order to uncover potential improvements. Advanced foresight at a relatively low cost enables manufacturers to not only design optimized processes, but also monitor for improvements.

Ensuring safety in food production. Food engineers and scientists are also working to address key issues in the field, such as food safety. Food that contains harmful bacteria, parasites, or toxic chemical substances can cause serious illnesses. Therefore, the food supply chain must be safeguarded from the introduction and growth of these various contaminants. Food fraud, defined by the Codex Alimentarius Commission as an action to “deceive others in regards to the integrity of food to gain undue advantage,” is another concern among food scientists. Food fraud can cause deadly health effects for consumers, and costs the food industry approximately \$49 billion per year when fraudulent products have to be recalled (1). About 10% of all commercially

produced food is affected by food fraud (2). Strategies to tackle this issue include the implementation of analytical testing, warning systems, and vulnerability assessment.

Addressing food waste. A focus on sustainability is another emerging trend in the food industry. According to the U.S. Dept. of Agriculture (USDA) Economic Research Service, 31% of the total food supply in the U.S. becomes food waste, or approximately 133 billion lb of food per year. Improper food waste management can cause negative environmental consequences, as 95% of food waste goes to landfills, where its degradation produces methane, a greenhouse gas. (See the special section on pp. 27–44 for more information.) The Food and Agriculture Organization (FAO) estimates the environmental cost of food waste is \$700 billion per year when accounting for released carbon, as well as the land and water costs associated with food production. As waste occurs in various parts of the food supply chain, it is critical that food engineers and scientists address waste from cradle to grave.

The FEED Institute. AIChE has created the Food Engineering, Expansion and Development (FEED) Institute, an AIChE Technological Community, to solve some of the challenges of the food industry through collaboration. FEED is a global organization of leading food technologists and engineers dedicated to the advancement of food safety and innovation. It will serve to connect people, cultivate knowledge, and catalyze the industry’s future. FEED is governed by a managing board of industrial and academic leaders, which determines the path of the Institute.

Being a member of FEED allows you to enhance your professional education and development. Benefits of membership include discounts on food-related AIChE events, including the remaining two events in 2021. Members will also have access to curated content and newsletters, and various opportunities to connect with food innovation experts and leaders in the field.

This year, AIChE will be hosting the 3rd Emerging Meat Alternatives Conference (EMAC) on Oct. 6–7, 2021 virtually, and the 4th Food Innovation and Engineering (FOODIE) Conference on Dec. 6–7, 2021 in Davis, CA. Visit www.aiche.org/FEED for more information and to become a member, or contact feed@aiche.org for more details.

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1. Johnson, R., “Food Fraud and ‘Economically Motivated Adulteration’ of Food and Food Ingredients,” Congressional Research Service, <https://fas.org/sgp/crs/misc/R43358.pdf> (Jan. 10, 2014).
2. NSF International, “Food Fraud/Defense Consulting Services,” <https://nsf.org/consulting/food/food-safety/food-fraud-defense> (accessed Aug. 17, 2021).