



Food technology transformation

**Attitude shifts drive new technology,
innovation in food development and production**

It's no secret that technology is playing an ever-increasing role in our lives, though consumers may not often think about the use of technology in terms of the food and beverages they consume. In truth, food technologists have been creating innovative and healthier foods for decades... a trend that is likely to ramp up in this era of health-conscious consumers who now have details about the processing, sourcing and sustainability of the foods they eat, right at their fingertips.

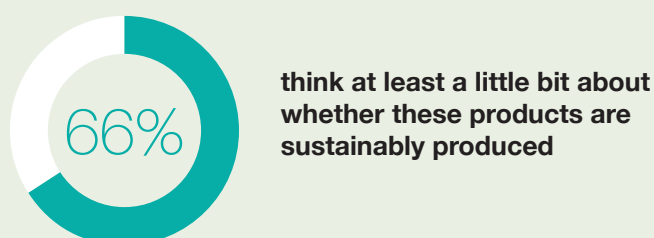
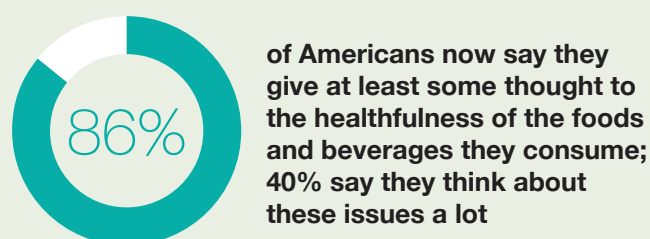
This forecasts further opportunities for brands that push the technological envelope in better-for-you, plant-based, functional and sustainable foods; it's also likely to extend to new opportunities in how we grow and source ingredients, as well as package products.

At the heart of these trends, there has been growing consumer interest in – and shifting attitudes about – food and health. For at least two decades, consumers have been connecting the dots between diet and health, but in the post COVID-19 world, efforts to control personal health are reaching new heights. Consumers also indicate growing interest in foods with a lower environmental footprint.

According to the International Food Information Council's 2022 Food and Health Survey, a majority of consumers are giving increased consideration to the healthfulness, safety and sustainability of their food.

These ideas have been bolstered by technology-literate young consumers who want to know the details about their foods and beverages... and know exactly how to find out.

This has shaped a younger generation of food consumers who are comfortable with technology. They are driving key mega-trends in food and beverage, along with the technologies that make them possible. For example, in the IFIC survey, the youngest cohort of adults, Gen Z, is propelling changes in health and sustainability priorities among the mainstream population, with 73% saying they believe their generation is more concerned about the environmental impact of food choices than older generations; however, this idea is nearly as prevalent among millennials, at 71%. What's more, the survey noted that younger generations are more likely to agree that online tools help them maintain a healthy lifestyle.



Source: International Food Information Council. "2022 Food and Health Survey."

Alternative technologies

These new attitudes have opened the door for technologies in food and beverage that were not predicted even a decade ago. Take the shift to plant-based eating and alternative proteins, which has become one of the most important food technology trends.¹ The popularity of plant-based products and alternative proteins has exploded recently,² driven by consumer concerns about climate change and animal welfare, in addition to the belief that they support a healthier lifestyle.³

Hartman analysts suggest this means that plant-based consumers are more likely to be receptive to innovation, especially if it helps solve problems related to food production. This will likely keep them at the forefront of food and beverage developments looking ahead.

A key technology in alternative protein production is fermentation. Perhaps one of the earliest food technologies, fermentation was originally used to prevent foods from spoiling and to create cultures for dairy products like kefir. The fermentation process is now also used to create alternative proteins.

There are three different categories of fermentation:

- **Traditional fermentation**, used to make products like beer, wine and yogurt and enhance product flavor. Believed to help make better use of existing ingredients.
- **Biomass fermentation** uses high protein content to create microorganisms that reproduce and become alternative proteins. Considered one of the most efficient ways to produce alternative proteins.
- **Precision fermentation** uses microorganisms to produce specific functional ingredients, such as diabetic insulin.

Source: The Good Food Institute. "The Science of Fermentation."

Overall, fermentation is considered to be an efficient process that is helping to produce protein products without elements like cholesterol, antibiotics and hormones.⁴

Personalized possibilities

As consumers ramp up their interest in eating for better health, demand for products that boast specific health benefits is also on the rise.⁵ This extends beyond nutritionally based, functional foods with ingredients like prebiotics and probiotics to those that support digestive function or address personal preferences such as reduced sugar or gluten-free.

Again, these products have gained traction in the market because of technologies that made them label-friendly, palatable and affordable. One of the newest technologies is using 3D printers and robotics to create personalized products at a commercial scale.⁶

Fermentation technology has also been helpful in developing useful and healthful ingredients in efficient and economically viable ways.

Stevia, for example, is a rising sweetener that gets its sweetness from compounds called steviol glycosides. Over more than a decade, suppliers have spent thousands of hours studying these compounds and found the sweetest ones (Rebaudioside M and Rebaudioside D) also happen to be the rarest. Cargill, a pioneer in this category, creates Reb M and Reb D via fermentation in a way that is not only more efficient, but can also reduce sugar by up to 100% while also enhancing product taste and texture.

Targeting transparency

Even as consumers accept these technologies, they want to know the details of how their food and beverage products are sourced and produced. This too is spawning new technologies like blockchain and traceability enablers, which help companies track where and how their ingredients are sourced, while monitoring and sharing details of product quality.

For instance, with 72% of consumers now noting that sustainability is something they are willing to pay more for,⁷ products that are produced sustainably (and can prove it) will be an important opportunity in new food and beverage product development.

Technology will help across the board. A case in point is EverSweet® stevia sweetener, made using fermentation. Most recently, it has been shown to be a more-sustainable stevia option through a comprehensive Life Cycle Analysis (LCA). In a joint venture with DSM, Cargill took a deep look at the environmental impact of EverSweet and its other stevia-based solutions. The third-party-verified LCA found that EverSweet provides significant environmental advantages, including a lower carbon footprint. EverSweet also needs less land for production and has a lower impact on ecosystems and water usage.

New techniques and innovations that address soil health, food waste and packaging issues will be the next frontier in the realm of sustainable products. Food producers are working to minimize food waste with new innovations that

upcycle or reduce food waste, such as converting spoiled fruits and vegetables into fruit powders, or using the waste products from chocolate to make a juice.

Packaging is another area where technology will play a role in solving the issue of plastic in our environment. New technologies are creating biodegradable packaging that degrade with the help of living organisms, and nanotechnology is creating smart packaging that can detect microbial changes in foods to help determine its quality and safety.

While some of these trends may be passing fads in the fast-paced food technology environment, others could present the next big solution that will have an indelible impact on the market. Brands that pioneer these technologies can be assured that consumers will be watching carefully – and likely receptive to viable solutions.

EverSweet®: a sustainable, scalable source of Reb M



In a third-party lifecycle analysis comparing 5 alternative sweeteners, EverSweet showed:

- **Lowest impact score** in 11 of 14 categories
- **97% lower environmental footprint** than Reb M stevia leaf extract
- **60% lower carbon footprint** than bio-converted Reb M

Learn more at cargill.com/eversweet

Stay on the leading edge of food technology innovation with **Cargill ingredients.**

¹ Status-Insights. "Discover Top Ten Food Technology Trends and Innovations in 2022." <https://www.startus-insights.com/innovators-guide/top-10-food-technology-trends-innovations-in-2021/>

² Plant Based Food Association. "2021 U.S. Retail Sales Data for the Plant-Based Food Industry." <https://www.plantbasedfoods.org/2021-u-s-retail-sales-data-for-the-plant-based-foods-industry/>

³ NBJ /NEXT data. "Plant-Based Foods Market Analysis. Attitudes and Opportunities in a Thriving Market." New Hope Network NEXT data and Insights. June 2021.

⁴ The Good Food Institute. "The Science of Fermentation." <https://gfi.org/science/the-science-of-fermentation/>

⁵ Ibid. Status-Insights.

⁶ Ibid.

⁷ The Hartman Group. "Sustainability Today: The Opportunity Gap." <https://www.hartman-group.com/infographics/305543123/sustainability-today-upcycled-foods-and-beverages>