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Editorial

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The silent revolution on our plates: why this is a time of unprecedented innovation in food science

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P Thirumalai Vasan
Assistant Professor, Department of Food Science & Nutrition, The American College, India

Correspondence: Dr. P. Thirumalai Vasan, Assistant Professor, Department of Food Science & Nutrition The American College, Madurai, Tamil Nadu, India, Tel: 9626362231, 7010223635

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Editorial

Food, of course, has always been more than just fuel. It is memory, culture, comfort and identity. From family recipes handed down through the generations to street food that defines cities, what we eat informs who we are. But behind your everyday breakfast, lunch and dinner is a rapidly advancing field that seldom gets the attention it warrants: food science. Though its mention may bring up dreary images of labs, preservatives, and artifice, what we're really talking about is so much more nuanced-and so much more critical. Silently, food science has been revolutionizing the way we grow, produce, preserve and understand what's on our plate - and it might be crucial to our future.

Food science, fundamentally, is a mix of past and future. It values the emotional and cultural significance of food, while using chemistry, biology, engineering, nutrition-all to make what we eat more safe, healthy and sustainable. As population increase, climate change related food insecurity and diet-related diseases continue to escalate as global challenges; the progress of food science becomes imperative. It is necessary.

Better food security is one of the major contributions by modern food science. Before refrigeration, pasteurization and preserving methods food poisoning was widespread, and frequently fatal. These days we don't think twice about the idea that milk is drinkable, that canned food won't harm us, and we can store leftovers in peace. Several generations' worth of research into food safety, microbial growth and temperature control have brought us these everyday conveniences.

Still, food safety is not a closed book. And as food systems grow increasingly global, one contamination event can sicken millions across borders. Thanks to new rapid pathogen detection, smart packaging, and traceability systems, scientists and producers can detect hazards sooner and contain outbreaks more efficiently. No system is perfect, but investing in food science-and other work to protect public health-also helps guard the public's well-being in ways most people don't even appreciate until something goes wrong.

Besides safety, food science has a vital part to play in enhancing nutrition. The paradox of the modern world is that, despite food production being more plentiful than at any time in history, so is the rate of diet-related disease including obesity, diabetes and heart disease. Processed food is often singled out-and with good reason. But the answer is not to deny food science, but to make better use of it.

Food engineers are designing foods that contain less sugar, less salt and fewer unhealthy fats, but don't lose flavour or convenience. They are also fortifying staple foods with essential vitamins and minerals to reduce deficiencies, especially among those most at risk. From iodized salt to iron-fortified grains, these improvements that saved millions of lives. More recently, studies on gut health, functional foods and personalised nutrition indicate food science might help you to make smarter choices when it comes to what you eat-away from generalised advice for all towards guidelines tailored just for you.

On the sustainability front, too, food science is taking bold steps. Conventional methods for producing agrarian and food products are increasingly dependent on land, water and energy. Climate change further exacerbates these pressures, and it is jeopardizing crop yields and food security around the globe. Food scientists are responding by investigating alternative proteins, increasing crop yields, reducing waste and creating eco-friendly packaging.

There's a hell of a lot more to plant-based or cultivated meat alternatives than passing, influencer-led fads. They are serious scientific attempts to mitigate the environmental effects of animal agriculture and yet still satisfy consumer demand for protein. Likewise, advances in food preservation and by product utilization can help mitigate the mind-boggling amount of lost food every year-food that cost resources to produce but provided nourishment for no one.

And yet, the public perception of food science is fraught. So-called "engineered" foods scare many consumers away: They equate scientific intervention with artificiality or a loss of authenticity. This skepticism is understandable. Food is a very personal thing, and trust is broken easily without transparency. You can throw the baby out with the bathwater and discount the science of food altogether, but it would take away just about everything that makes up our modern diets (from apples we could eat off a tree to bread you could bake at home).

The real issue isn't science in food, but the way it is used and how ethically. Transparency, authentic communication and consumer education are as important as innovating itself. The moment the public understands why certain technologies exist and how they work, fear is replaced by informed choice. The schizofoodological message ought to be exactly the opposite; food science should empower consumers, not produce confusion.

Another often unappreciated dimension of progress in the science of food is its potential for reducing global inequality. As some cultures dispute the definition of organic labels or diet trends, others are just facing a challenge to find safe, nutritious foods. This

gap can be narrow with the help of food science, by creating cost-effective, nutritious foods that have long shelf life and could reach out to isolated or low resource regions. In this way, food science isn't simply about creativity-it is about justice.

Naturally, any progress must be governed by responsibility. The ability to do so does not mean it is morally acceptable. Issues surrounding genetic engineering, information-based food and corporate power in food systems warrant attention. We need open, sustained dialogue between scientists and others to support innovation that benefits the public interest instead of the narrow interests of elites.

What is particularly fascinating about food science is that it lies at the crossroads of science and everyday life. Unlike other technologies that often seem abstract or far away, food science touches us several times a day, every day. Each meal is a reminder of how much progress we have made-and how far we have left to go.

With the growth of the world population and increasing environmental challenges, the importance of food science will only increase. The food of the future could include smarter farms, healthier crops, personalized diets-and less waste. It may also force us to reconsider our relationship with food as such: tradition against innovation, comfort over responsibility.

In the end, progress in food science is not about replacing home cooking, cultural heritage or simple pleasures. It's that there need to be some opportunities and some pleasures available for everyone. And when it's disciplined by ethics, transparency and compassion, food science becomes not the enemy of the table but its silent guardian. And in such an uncertain world, that may be one of the most valuable things science has to offer.

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