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Food science and technology advancement for feeding the world population

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DESCRIPTION

As the world's population is increasing steadily, the Earth's capacity to renew its resources is continuously declining. As a result, the biological resources needed for food production are diminishing and new approaches are needed to feed the current and future global population. Over the past few decades, scientists have developed new strategies for reducing food loss and waste, improving food production, find new ingredients, designing and building new food structures, and introducing digitalization into food systems.

The capacity to regenerate the earth's resources is reducing continuously and drastically due to the exponential growth of the population around the globe. In the last 50 years, the world's population has doubled, but the Earth overshoot day, the day humanity has exhausted the Earth's annual renewable biological resources, has continuously become earlier, reaching its earliest date (July 29) in 2018 and 2019. Earth overshoot day has been postponed to August 22, 2020 due to a new coronavirus pandemic. But this delay is the result of a pandemic, not the long-term planning strategy that is still needed to improve the sustainability of our society. We need biological resources to feed people. However, production, including food loss and waste, accounts for 26% of the human ecological footprint. This is due to the low efficiency of food production and non-optimal waste management. By taking action and promoting sustainable behavior throughout the food chain and among consumers, we can delay Earth overshoot day and preserving Earth`s regenerative capacity.

By 2050, the population is expected to reach 9.7 billion and ensuring global food security will be a priority. The first step towards food security is to reduce food waste and losses. According to the Food and Agriculture Organization (FAO), about 1.3 billion tons of food are lost and wasted annually in the food chain from production to retail and to consumers, highlighting the importance of a circular economy and consumer education. In addition, economic barriers need to be addressed to give low-income consumers access to healthier and more sustainable food. But reducing waste and economic barriers is not enough to achieve global food security. To feed the world's population in 2050, food production needs to increase by 70%. In addition, diets need to change and rely less on animal products, such as products based on plants, insects and microalgae. This change is necessary because the diet of animals is relatively less sustainable due to the need for natural resources, resulting in more environmental degradation. Unfortunately, changing food production and consumption habits is not an easy process. It must be efficient, sustainable and economically feasible. New foods should be nutritionally adequate, culturally and socially acceptable, economically accessible and palatable. In addition, new foods should be aimed at maintaining or improving the health of consumers. Food science and technology will help address these issues by improving food production processes with new ingredients from more sustainable sources and developing new highly-accepted food products.

However, the benefits of consuming new and improved foods are not enough to impact consumers. In fact, food acceptance and demand varies around the world based on geography, social structure, economy, personal income, religious constraints, available technologies, and more. Food safety and nutritionally adequate foods (in terms of both macronutrients and micronutrients) are of most importance in low-income countries, while middle- and high-income countries prioritize food to reduce the risk of chronic disease. The same is true for functional and environmentally friendly foods. The concept of food has evolved from the amount of nutrients humans need to survive on a daily basis to tools for dealing with nutrition-related diseases. Food takes into account the needs and requirements of consumers. In spite of this, across countries, personal income can limit the access to

sufficient food for survival, let alone new and improved food products that have extra benefits.

Coupled with this complex scenario, food demand is also constrained and affected by human psychology. Human's naturally occurring conservative and neophobic behavior towards new foods causes nutrition-related diseases due to poor dietary patterns established from an early age, and foods containing new ingredients such as Western insects. In addition, the introduction of new food products from food waste and by-products of new technologies and ingredients into the diet can be undermined by the low receptivity caused by human psychology. Therefore, consumer behavior must be taken into account for the successful integration into the diet. Finally, it should be remembered that food consumption is also determined by pleasure and not a mechanical process driven by calories requirement. The latter concept is particularly important when consumers are expected to change their eating habits. New foods developed using sustainable ingredients and processes are designed to take into consideration sensorial attributes and psychological considerations, which will allow a straightforward transition to more sustainable diets.

The actions needed in the food sector to develop a sustainable society that allows the regeneration of the Earth's bio-resources are several. These include changing our eating habits and food choices, reducing food waste and loss, preserving biodiversity, reducing the prevalence of food-related diseases, and balancing distribution of food in the world. To drive these actions, new ingredients and technologies are needed.