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UPF, THE SMOKE-SCREEN

We are obsessed with processed foods. If there is a disease we can't find a causative factor, we seem to be getting into habit of blaming processed foods for that. Yes, there are many processed foods that may be unhealthy if we consume too much of them. There are those that have high saturated fat, sugar and salt. There are many that have refined ingredients with lowered dietary fibre and lost micronutrients but we love to generalise and say that most processed foods have this problem.

Some thought that it was not enough, but should put a nail in its coffin, so they found a convenient word, ultra-processed foods (UPF) with a convoluted definition that is neither scientific nor clear. This effort was probably to create a confusion among people so they would start getting afraid of any factory produced foods. May be there is some bias lurking against industry behind such effort rather than the goodwill for common people and their health.

Yes, industry is not charitable organisations but set up with commercial motive to earn profit. They certainly do not want their consumers to get ill and suffer. They want the consumers to be healthy so they will again and again purchase their products. Such fears have probably come from the Western societies where regulators are considering making regulations to protect consumers from ill-effects of ultra-processed foods.

Apparently, some feel that Indians should avoid processed foods or ultra-processed foods and only consume home-cooked foods. We are consuming home-cooked foods. Unlike consumers in the US and Europe who prepare most of their foods from processed foods or UPF. It is very difficult for their consumers to cook from staples like we do. Many surveys have shown that Indians have been consuming 80 to 90% of their diet from home-cooked foods. Yes, there is a large market for processed foods, but in comparison to the population we have, the per capita consumption is very small.

There is a section of people, especially upper class that is consuming sizeable amounts of soft drinks, baked goods including pizza, donuts, biscuits and cakes and many fried fast foods. They spend a lot of time in digital gadgets and do not get adequate physical activity. Yes, they do need to be made aware of what they are consuming and how unhealthy diet could affect them adversely. However, a large majority is still not gone there yet.

Let us concentrate more on the large majority that still probably has deficit of proteins and other essential nutrients. We are talking endlessly about lifestyle diseases whereas the large majority still cannot afford fresh foods that we recommend. We probably should try to suggest ways to improve their nutrition rather than use Western ideas that are not really useful to our population except for a small minority of well-to-do people. At least industry is doing something about deficiencies by offering fortified foods but then these are frowned upon, calling them UPF.

Let us not hide behind such big Western problems if we cannot find solutions to real Indian problems. Research on such topics will certainly be published easily in reputable journals and get us credits but our problems still remain unsolved. We are talking of environmental changes that would create even worse problems for our population. Let us start thinking about how to solve these problems, the solutions for which will go a long way, even though Western publications may not carry them.

We have an extremely useful article in this issue on UPF that gives us some direction. We should follow that in a scientific way to achieve something that is relevant to us. Then we can classify foods as per their nutritive and health value that consumers can easily recognise.

Prof Jagadish Pai, Editor, PFNDAI

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KNOW THE ACT BEFORE ACTING

AUTHOR

Dr Joseph I Lewis,
Chairman, Regulatory Affairs,
PFNDAI

Governments endeavour to maximise legislative outcomes with minimal distress to economic enterprises by ensuring institutions use the law judiciously.

Procedures established by law mean that a law duly enacted by legislature is valid only if the correct procedure has been followed - to the letter. In turn, Regulatory Authorities should be very concerned when officials fail to do so. Secondly, another distressing factor is misreading risk management options - intended to secure the safety of supply chains - as an invitation to prosecute. Suspending a license without issuing an improvement notice - required by law - is a case in point. Such issues put doubt on how compliant the Authority is with the statutes. It could be an aberration, but the time scale of such occurrences suggests a typical behaviour.

Food Safety Acts are preventive. Prevention means being watchful. Statutes define watchfulness in a formalistic way. But it will clearly say who does what, how and where. The "what" begins with the definition of food safety (3q): the 'assurance' that food is acceptable for human consumption according to its intended use. FBOs and Authorities– are "who". 'Where' is specified inall stages: production, processing, import, distribution, and sale. It begins by granting an FBO facility a license on its capability to provide food acceptable for human consumption. The Food Safety Management System (FSMS), verified and accepted by the DO (sec 31), is a written record of this capability and acceptance. Watchfulness commences with FBOs in self-control (Chapter VI) and FDAs monitoring and verifying their effectiveness (Chapter VII).State FDAs can use several risk management options (u/s32-34) to urge FBOs into compliance. In their eagerness to prosecute, officials do not see – or ignore - the distinction between risk management and prosecution.

This has been happening since the implementation of the Act. In 2011, a Designated Officer (DO) issued an Improvement Notice (IN) on a milk fat package for misbranding without stating the grounds of failure nor proposing corrective measures and allowed the FBO only five days to comply instead of fourteen. The DO failed to recognise the risk management control measure; likely, he didn't understand the Act and its purpose. The Court noted from a plain reading of the statute that it could not be an IN as nothing was suggested that the Firm was required to improve. The DO could have also been unsure of the reasons for non-compliance and its remedy.
Misreading statutes is overcome by learning and training.

If risk management actions are not recognised, an unrestrained tendency to prosecute will prevail. On inspection (15.10.2018) and testing, a package of lotus seeds was misbranded, as the best-before date (BBD) was not incapital letters, despite the Director (Regulatory Compliance) advising FDAs three months earlier (17.07.2018) that for minor labelling defects of insignificant nature process under Section 32 should be followed. Not understating the regulatory structure is often made up by issuing new rules, complicating what is simple. Another letter followed (17.01.2020), with a list to bring meaning to " insignificant nature". However, neither letter dissuaded the Adjudicating Officer from levying penalties until a court reversed them.

Plugging loopholes solves nothing; it soon becomes the next problem, and another rule emerges. The only solution is to know the Act before acting.

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Finamul 4087L: Functional Emulsifier System for Cookies

FINE ORGANICS

Cookies are the most sought-after snack in India. However due to its higher fat content (+20%) consumer trend is more toward low fat options. Hence, manufacturers are finding ways to reduce the fat content without affecting textural & sensorial attributes.

Fine Organic's functional emulsifier system Finamul 4087L enables manufacturers to reduce fat by 7-10% in cookies.

Control	T1	T2

Excellent texture, richness and mouth-feel at lower fat content have been observed while using Finamul 4087L

Parameters	Control	T1	T2
Fat (%)	100	100	90
Emulsifier		Lecithin (322)	Finamul 4087L
Cream density	0.618	0.569	0.557
Avg. height of 10 biscuits (cm)	8.4	9.4	9.5
Avg. Weight of 10 biscuits (g)	111.2	111.5	114
Avg. Diameter (cm)	5.6	5.5	5.5
Spread ratio	0.66	0.56	0.58
Bite	Slight hard	slight crispy/soft	Soft/crispy

10% lower fat with excellent textural properties

Advantages of Finamul 4087L :

- Increased stack height
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ROLE OF FOOD INDUSTRY IN FOOD SECURITY AND NUTRITION SECURITY

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Food and nutrition security are critical global challenges that depend on ensuring access to safe, affordable, and nutritious foods, both fresh and processed, for all people. As the world's population is expected to reach 9 billion by 2050, increasing food production will be essential to meet this rising demand. However, equally important will be reducing food losses throughout the supply chain and improving the preservation, nutritional quality, safety, and shelf life of foods. In an era where over 800 million people face chronic hunger and nearly 2 billion suffer from micronutrient deficiencies, the food industry stands at the forefront of efforts to ensure food and nutrition security.

- Food security is defined by the Food and Agriculture Organization (FAO) as a condition in which "all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life" (FAO, 2006).

- Nutrition security emphasizes not only the availability of food but also its nutritional quality, focusing on "the access by individuals to enough food for an active, healthy life, and to essential nutrients for growth and development" (Global Nutrition Report, 2020).

As a complex web of producers, processors, distributors, and retailers, the food industry has the capacity to influence dietary patterns, food availability, and nutritional outcomes on a global scale.

Through innovative approaches, sustainable practices, and strategic partnerships, the food industry can address not only the quantity of food produced but also the nutritional value, ultimately contributing to healthier populations and more resilient food systems.

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Food security and nutrition security are closely interlinked, while food security ensures the availability and access to sufficient food, nutrition security focuses on the quality and healthfulness of that food.

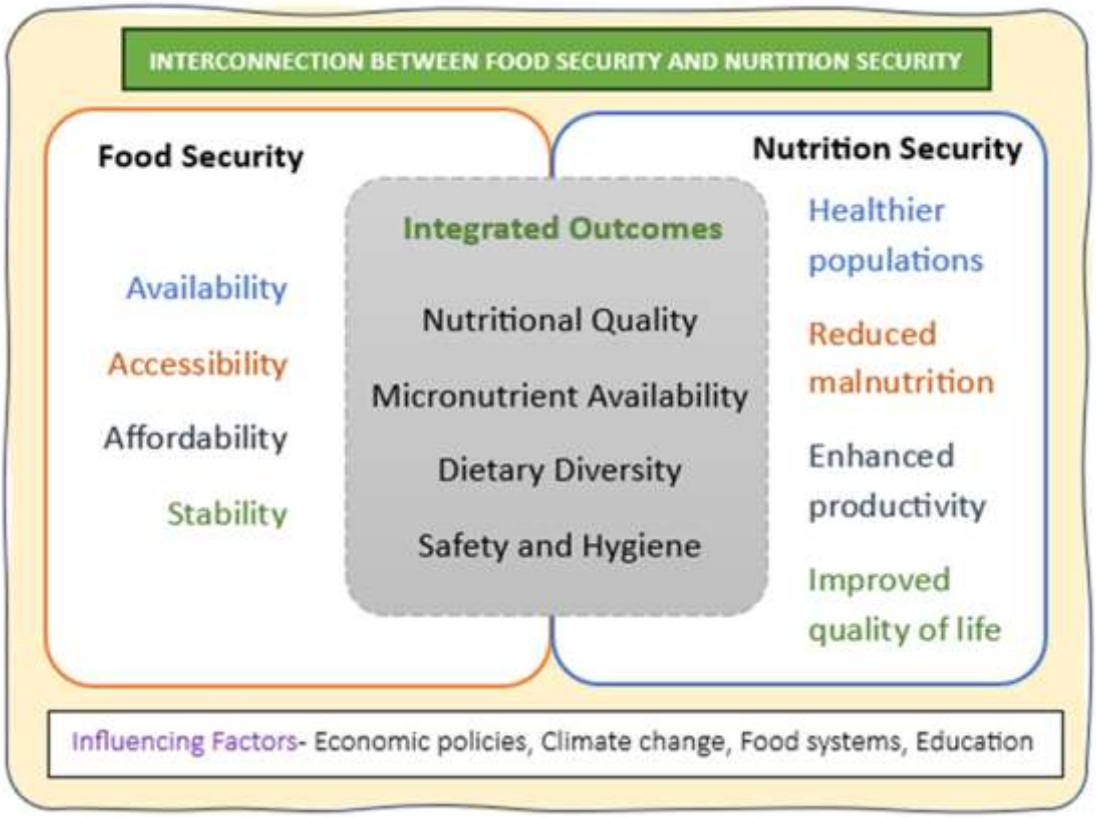


Fig 1: - Interconnection Between Food Security and Nutrition Security

Together, they create a framework where adequate food supply contributes to overall health and well-being, reducing malnutrition and promoting healthier populations.

Food Processing Landscape

The food industry is a complex network encompassing agriculture, food processing, distribution, and retail. Agriculture provides raw materials like grains, fruits, and vegetables, valued at approximately $3 trillion globally[1]. Processing converts these ingredients into consumable products, contributing around $1 trillion to the global economy. This industry is crucial to the global economy, accounting for about 10% of global GDP and employing over 1 billion people worldwide[2]. It also plays a vital role in food security, ensuring access to nutritious food for a projected population of 9.7 billion by 2050[3].

However, the food industry faces significant challenges. Climate change threatens crop yields, with estimates suggesting a potential decrease of up to 30% in key crops by 2050[4]. Supply chain disruptions, highlighted during the COVID-19 pandemic, revealed vulnerabilities, leading to food shortages and price increases[5]. Additionally, shifting consumer preferences toward healthier and sustainable options, alongside regulatory pressures for improved food safety and environmental sustainability, complicate the landscape. Addressing these challenges requires innovation, collaboration, and a commitment to sustainable practices to enhance the resilience of the food industry amid evolving global demands.

The use of both traditional and emerging processing technologies is crucial in developing food products that help tackle food waste while addressing food and nutrition security.

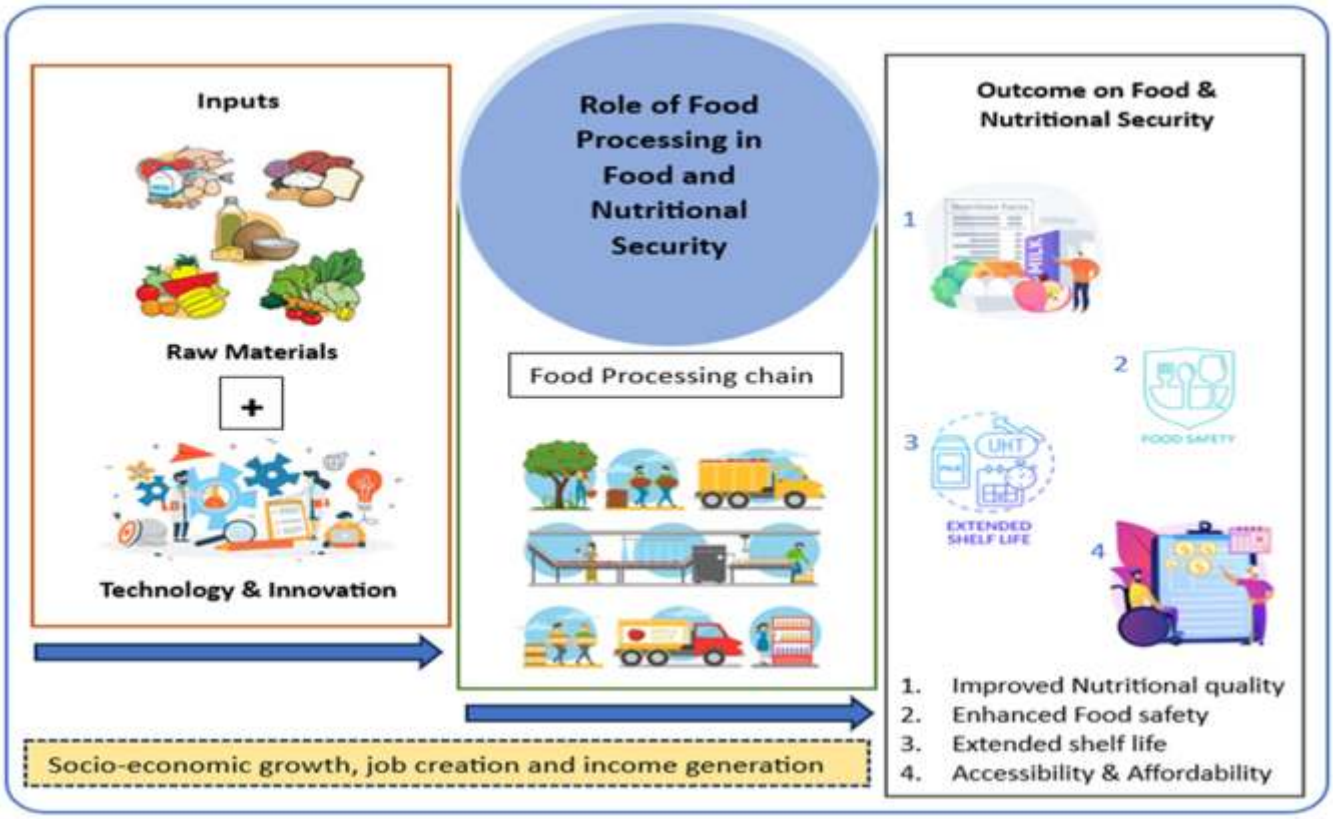
Traditional methods such as drying, fermentation, and pickling have long been used to preserve food, extend shelf life, and reduce waste. These techniques help minimize spoilage and retain the nutritional value of ingredients, ensuring that essential vitamins and minerals are preserved. On the other hand, emerging technologies like high-pressure processing (HPP), vacuum cooking, and microwave-assisted thermal sterilization (MATS) offer advanced solutions that preserve the nutritional integrity of foods while reducing the need for preservatives. These modern methods also make better use of raw materials, enabling the efficient processing of food by-products like fruit peels, seeds, and stems, which would otherwise go to waste. By repurposing these by-products into value-added food items, the industry is reducing food waste and making more sustainable use of available resources. Furthermore, these technologies improve the shelf life and safety of food, ensuring that nutritious products are available to consumers for longer periods, particularly in regions with limited access to fresh foods. Through a combination of traditional and innovative approaches, the food industry is making significant strides in reducing waste while promoting food security and improving overall nutrition.

Additionally, these advanced techniques allow for the efficient use of raw materials, reducing food waste and improving sustainability. For example, companies are increasingly using food by-products—such as fruit peels, stems, seeds, and even fish bones—to create nutritious, value-added products that would otherwise be discarded. Innovations like plant-based proteins from discarded pulses and grains are gaining popularity as alternatives to meat, which help reduce food waste and offer sustainable protein sources. Through a combination of traditional and innovative processing methods, the food industry is creating more sustainable, nutritious food products that not only reduce waste but also improve global food security and nutrition outcomes. By enhancing food access, safety, and shelf life, these technologies are making it possible to provide high-quality, nutrient-dense foods to populations worldwide, particularly in regions affected by food insecurity or limited access to fresh, perishable foods. This holistic approach to food processing is critical for achieving long-term sustainability, improving global health, and addressing the challenges of food waste and malnutrition on a global scale.

Role of Food Processing in Achieving Food and Nutrition Security

Food processing is a cornerstone of global food security, playing a pivotal role in ensuring that safe, nutritious food is available, accessible, and affordable to all. Through advanced processing technologies, the food industry helps extend the shelf life of perishable goods, reduce food waste, and improve storage methods. This enhances food availability across regions, particularly in remote or underserved areas, and stabilizes food supplies in the face of seasonal variations and climate challenges. Processed foods, such as canned vegetables, dried fruits, and frozen meats, enable year-round access to essential nutrients, while food safety is enhanced through techniques that reduce microbial contamination, safeguarding consumers from foodborne illnesses.

Fig 2: - Role of Food Processing achieving in Food and Nutritional Security



In the realm of nutrition security, food processing has a transformative impact on the quality and accessibility of food. By using processing technologies, the food industry can boost the nutrient density of everyday foods, making it easier to deliver vital vitamins and minerals to populations in need. Fortification of staple products like salt, flour, and oil with micronutrients such as iron, iodine, and vitamin A has proven highly effective in preventing deficiencies and reducing malnutrition. Processed foods also serve as "nutrition delivery vehicles" where products are specifically formulated to provide a range of nutrients, helping to improve health outcomes, especially in vulnerable communities.

Key Challenges: - The food industry faces several challenges in addressing both food and nutrition security. Maintaining the affordability of processed foods is a constant concern, particularly in low-income areas, while ensuring that smallholder farmers are integrated into supply chains remains a complex issue. Sustainability is also a major hurdle, with energy consumption and waste generation in food production requiring urgent attention. The solution lies in adopting sustainable practices, such as the use of renewable energy, reducing packaging waste, and integrating circular economy principles. Additionally, local food processing initiatives offer a pathway to create jobs, boost employment, and further enhance food accessibility, especially in rural regions. Strengthening logistics and supply chains will also be essential to ensure that processed foods are distributed efficiently, reaching consumers where they are needed most.

On the nutrition security front, the increased consumption of highly processed foods has become a growing public health challenge, contributing to the rise of diet-related diseases such as obesity, diabetes, and heart disease.

This issue underscores the need for food companies to adopt a balanced approach—focusing on reformulating products to reduce detrimental ingredients while enhancing their nutritional value. In addition to reformulation, clear food labeling is a key tool in empowering consumers to make more informed choices.

Labels that provide easy-to-understand nutritional information guide individuals in selecting products that align with their dietary needs. Consumer education and public awareness campaigns play an equally important role in promoting healthier lifestyles, providing guidance on balanced diets, and encouraging positive changes in food consumption habits.

Collaboration with health organizations such as the World Health Organization (WHO) and GAIN helps to amplify these efforts, ensuring a unified approach to improving nutrition education globally. Through these combined efforts, the food industry can help promote long-term nutrition security, fostering healthier communities and reducing the prevalence of nutrition-related diseases.

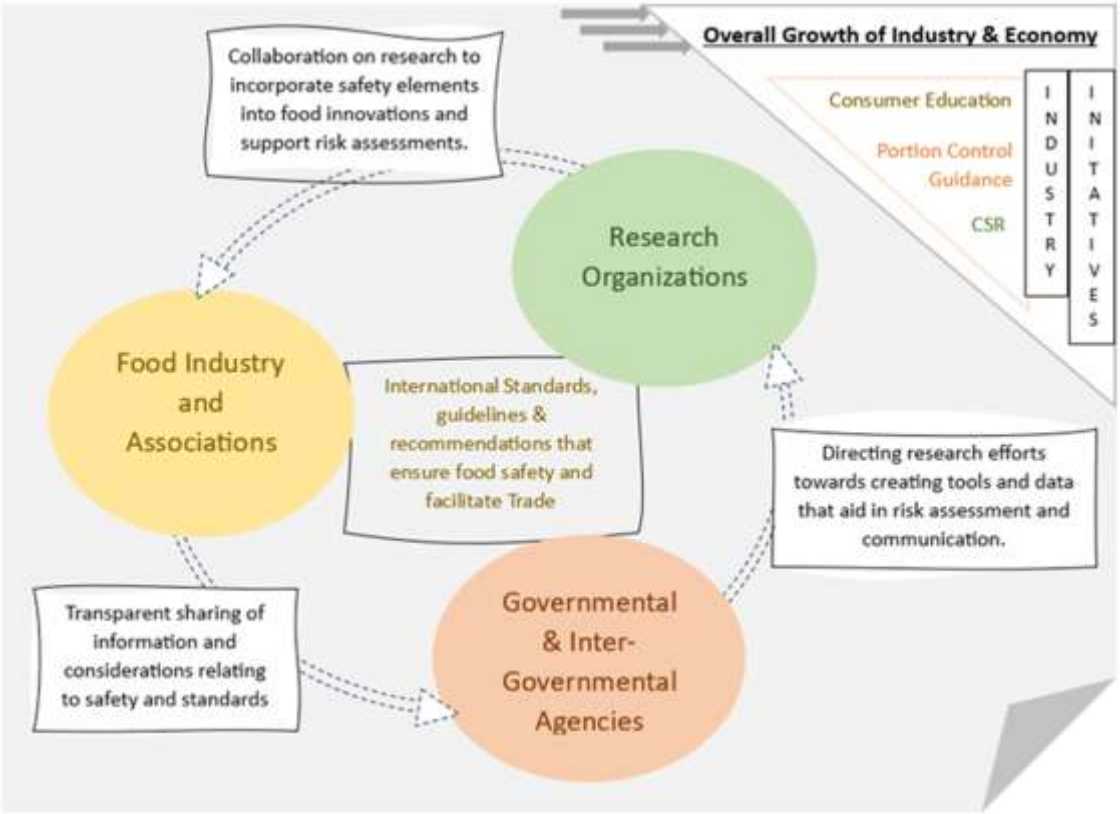
Conclusion

The global food industry plays a pivotal role in addressing food and nutrition security, contributing to the well-being of billions. It employs over 1.5 billion people globally and produces enough food to feed 10 billion people. However, despite this vast production, approximately 735 million people still face hunger, underscoring the ongoing challenges in food distribution and access[7].

In addition to improving food production, the food industry is also at the forefront of waste reduction efforts. The industry helps cut food waste by 30-40% through enhanced logistics, supply chain improvements, and better storage solutions. However, despite this progress, about one-third of global food production approximately 1.3 billion tons is still wasted annually, which the industry aims to halve by 2030 through targeted interventions[7].

In the realm of nutrition security, the food industry has made considerable progress, particularly through its Corporate Social Responsibility (CSR) initiatives.

Fig 3: - Collaboration between key stakeholders



Corporate partnerships have facilitated the delivery of fortified foods to over 150 million children globally through school feeding programs. Food fortification programs have reached over 2 billion people by enriching staples like rice, salt, and flour with essential vitamins and minerals. Furthermore, food companies have pioneered innovations in healthier food products, such as reduced-sodium options, while also promoting consumer education on healthier eating habits and encouraging portion control.

These efforts are complemented by the industry's increasing investment in sustainable farming practices and local food systems through Corporate Social Responsibility (CSR) activities. Many companies are focusing on improving rural livelihoods, supporting smallholder farmers, and developing sustainable sourcing practices that enhance food security while promoting environmental sustainability.

Through these combined efforts in reducing food waste, fortifying food, and addressing malnutrition through Corporate Social Responsibility (CSR) partnerships, the food industry is making significant contributions to achieving food and nutrition security worldwide.

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ULTRAPROCESSED FOODS- THE DILEMMA OF A NEW LEMMA- PART 2

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PREFACE

Ultraprocessed foods have increasingly become a focal point in discussions about dietary health and public nutrition. A significant body of research indicates that these foods, which are typically characterized by their high levels of industrial processing, additives, and low nutritional value, are contributing to adverse health outcomes.

In Part 1 we discussed the NOVA classification system, it falls short to serve as a useful framework to categorize food types based on their processing. This classification has ramifications on processed food industry. It is imperative for policymakers, healthcare professionals, and the public to reassess dietary practices and promote healthier alternatives to combat the obesity epidemic and improve overall health outcomes with right perspective. In Part 2 we discuss how best to leverage the learnings from UPF literature and considerations to create a sure-footed transition in food habits in the interest of public health.

DE-PROCESSING THE NOVA CLASSIFICATION

If one were to browse the social media, the definition of UPF is changing like "Chinese Whispers," with authors taking the liberty to redefine the term using their own experiences and interjections. Hence even though de-processing is not a word in the English dictionary, I think it would be appropriate term to address the stigma thrusted by the NOVA classification on Processing. However, any attempt to do so has to have a scientific basis.

As one would expect, based on the heavy dependence of UPF definition on nutrient content, it is likely that individual nutrients (not individual foods) have strong correlations with adverse health outcomes. And potentially some nutrientsin UPF will havefavourable health outcomes, an area completely ignored by NOVA classification.

Fortunately, the FAO document (4) has provided a section of such associations.

These nutrients include,

a. Free/ added sugar: Significant, direct, dose-response associations between the dietary share of ultra-processed foods and the dietary content of free/added sugar.

b. Saturated and trans fats: Significant, direct, dose-response associations between the dietary share of ultra-processed foods and the dietary content of saturated fat or the probability of excessive saturated fat intakes (ten percent of total energy intake) were found in ten countries.

c. Sodium: Significant, direct, dose-response associations between the dietary share of ultra-processed foods and the dietary content of sodium or the probability of excessive intakes (2000 mg/ 2000 kcal) were found in the UK, Australia, and Belgium

d .Energy density : Significant ,direct ,dose - response associations between the dietary share of ultra processed foods and energy density of diets were found in all five countries where these associations were studied Australia , Canada ,Chile ,Colombia ,and Mexico) .

On the favourable side ,the NCD protective nutrients are ,

a .Protein :Significant , inverse ,dose response associations between the dietary share of ultra - processed foods and dietary content of protein

b .Fibre :Significant , inverse ,dose response associations between the dietary share of ultra - processed foods and the dietary content of fibre .

c .In the US ,there was a significant dose response inverse association between the dietary share of ultra - processed foods and a 'heathy' dietary pattern , richer in fibre ,potassium , magnesium ,and vitamin C ,with less added sugar and saturated fats .

The role of nutrient levels in health outcomes is reinforced through above mentioned findings .There is a strong case to change the focus from processing to formulation and it would be more accurate to focus on ULTRA FORMULATED FOODS instead of UPF .

This will help develop formulation guidelines that are tangible .Most biological effects tend to be co - operative in nature .It is therefore important to identify "threshold" levels , if any ,through dose - response studies .

UPF is a generalization that is overly dependent on processing terminology and cannot integrate the nuances of biological phenomenon .There are significant opportunities to address health issues through initiatives targeted at reduction in consumption of individual nutrients .

IMPLICIT INFERENCES AND INSIGHTS

1. UPF research provide correlations with adverse health outcomes in large body of work, in select 10-12 countries, but no causal relationship established yet.

2. The adverse effects demonstrated are invariably linked to obesity which in turn is linked to overconsumption attributable to palatability.

3. NOVA classification is a great tool for research but is incomplete and can create ambiguity, disparity and misconception in its current form if adopted for regulatory purposes or consumer communication/ education. Not all products classified as UPF will necessarily have adverse health outcomes.

4. Ultraprocessing is a term where processing plays a secondary role to ingredients and nutrient density.

5. Monteiro, one of the proponents of NOVA classification clarifies, Food processing in itself is not the issue. One obvious reason is that nowadays, practically all food is processed in some sense and in some way. The term 'processing' is very general and therefore not helpful, and so judgements of foods simply because they are 'processed' are not meaningful. (Monteiro, 2009) (10).

6. Most of the research related to UPF deals with cumulative dietary share of UPF and not individual ultra processed foods.

7. Substantial data exists of nutrients correlating with UPF consumption.

Addressing the concerns of NCD through addressing the intake of UPF associated nutrients will be as effective and more manageable than UPF as a group.

We need to keep these generalizations in mind when we begin to reflect on the Indian context.

INDIAN CONTEXT: REFLECT BEFORE WE RESONATE

The regulation of ultraprocessed foods (UPFs) is an increasingly critical issue for public health authorities globally. As various countries and organizations implement policies to mitigate the health risks associated with UPFs, India faces a unique set of challenges. The rising incidence of obesity within the country necessitates a cautious approach, given the distinct cultural, economic, and dietary contexts prevalent in India.

On the obesity scale, in 2023, India was ranked 172 with about 7.21% population obese. This is no reason to rejoice because data from the National Family Health Survey (NFHS-5) (2019-2021) (11) indicates that abdominal obesity levels in women stand at 40%, compared to 12% in men. Given the disparity in the levels between women and men (with much similar food consumption pattern) the data would most likely not support any strong links UPF consumption, it is however, a cause for concern as countries in the top 20 rank on obesity scale have obesity in the range of 30%. While dealing specifically with Processed Foods or UltraProcessed Foods we need to factor the following:

1. India boasts a youthful demographic, with a significant proportion of the population entering the workforce annually. This demographic shift has led to an increased reliance on processed foods, as many individuals transition away from traditional home-cooked meals. While the Indian food industry continues to evolve, it demonstrates considerable innovation in meeting the culinary needs of its diverse population.

However, the negative connotations associated with terms like "minimal" or "ultra" may foster skepticism among consumers, potentially stifling innovation and the emergence of new ventures within the sector.

2. Research conducted by Hall, discussed earlier, presents compelling data regarding the cost disparities between UPFs and unprocessed foods. For the study, the weekly expenditure on UPFs was recorded at $106, compared to $151 for unprocessed food items. This delineation underscores the food industry's crucial role in stabilizing food expenditures, particularly important in a country like India where food inflation can significantly affect overall economic progress. Heightened financial burdens imposed on processed food products could inadvertently lead to increased competition from substandard alternatives and impede investment in healthier innovations.

3. A close examination of the NOVA classification system indicates that it focuses not solely on processing but also considers the nature of the ingredients utilized. Current regulatory efforts in India, regarding high-fat, sugar, and salt (HFSS) content are laudatory and will be beneficial if right momentum is maintained in their implementation. UPF literature may warrant scrutiny of artificial additives, if the intake is above recommended/global levels, to have greater alignment with NOVA findings. Developing guidelines based on formulation under the umbrella of Ultra Formulated Foods (UFF) is far more feasible and sensible.

4. Recent findings of a systematic review published in Eur J Clin Nutrition (2022) (12) on the Role of UPF in obesity of Children and Adolescents failed to demonstrate significant correlations in four cross-sectional studies but found associations in longitudinal studies, warranting further studies.Earlier, two national surveys in the United Kingdom and France failed to show any link between body mass index and consumption of ultra-processed foods (5).

India possesses an effective nutrition monitoring and national family health survey framework, overseen by government agencies. It is imperative that UPF consumption is incorporated into this framework, if not already instated, to elucidate the correlation between consumption patterns and health outcomes. The Food and Agriculture Organization (FAO) has provided pertinent guidelines on integrating processed food data within food consumption surveys (4). This will serve as a confidence building strategy.

5. Initiatives from the Food Safety and Standards Authority of India (FSSAI) like Eat Right India to promote balanced eating in terms of quantity and quality can give greater emphasis to the Enabling Healthy Choices program, through Reduction in Salt, Sugar and Fats in our daily diet. Enhancing awareness of a marker such as body mass index (BMI) in individuals should also take precedence.

Weight gain is the first visible and easily measurable symptom of any future health deterioration in individuals. In the initial stages it is easily reversible unless there is a genetic pre-disposition. All efforts to promote ideal weight without creating a stigma for overweight is an important challenge ahead of us. We must encourage the food industry to deliver palatable healthy products.

6. The Indian food industry prioritizes health and safety, adapting consistently to the evolving preferences and needs of consumers. However, such changes come at a cost, necessitating a well-paced regulatory framework that facilitates the transition.

Although the concerns raised regarding UPFs are valid, substantial research is still required to establish a comprehensive understanding that encourages both consumers and the industry to adopt a change rationale, if any, that does not compromise on palatability, cost, or convenience. In the meantime, a systematic, stepwise approach aimed at mitigating overconsumption and maintaining optimal weight will prove beneficial.

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Editor's Note: This article was invited to prepare the Indian Food Industry on this emerging topic of Regulatory Significance. It would be nice if the industry considers these extremely critical views expressed so lucidly and PFNDAI can prepare a Consolidated Document on UPF for consideration of various authorities and the Government. Industry leaders can also send their additional views in this regard that could be incorporated in the final document.

ROLE OF PROTEIN IN GENERAL WELL-BEING AND SPECIFIC NUTRITIONAL REQUIREMENTS

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Protein - a nutrient that we all come across at some point of time as a very important macronutrient and that one should consume proteins through their diet. So why should one consume protein as a part of their diet?

An adequate consumption of dietary protein, which is recommended also as a dietary allowance for populations, is deemed important for the maintenance of optimal health, growth and development and function in one's life[2]. And when we talk about proteins, the muscles are not left far behind. And rightly so, since muscle protein serves as the primary repository of amino acids. Free amino acids derived from muscle protein breakdown are used in the synthesis of immune system components, plasma proteins, peptide hormones, and intra- and extracellular enzymes and many other physiological processes (Figure 1).

The skeletal muscle protein is said to alternate between states of:
a. Negative protein balance (where muscle protein synthesis< muscle protein breakdown; largely in response to fasting).
b. Positive protein balance (where muscle protein synthesis > muscle protein breakdown; largely in response to feeding).

How much muscle protein is synthesized or how much the protein breakdown is suppressed is said to be influence by the dietary protein intake, protein quality and its format[2].

In addition to the kind and format of protein, optimized protein intake, along with kinetic stimuli (includes exercise, walking etc.) enhance the repair and re-modelling of existing proteins, help in synthesis of new muscle proteins and also influence muscle maintenance and growth[3].

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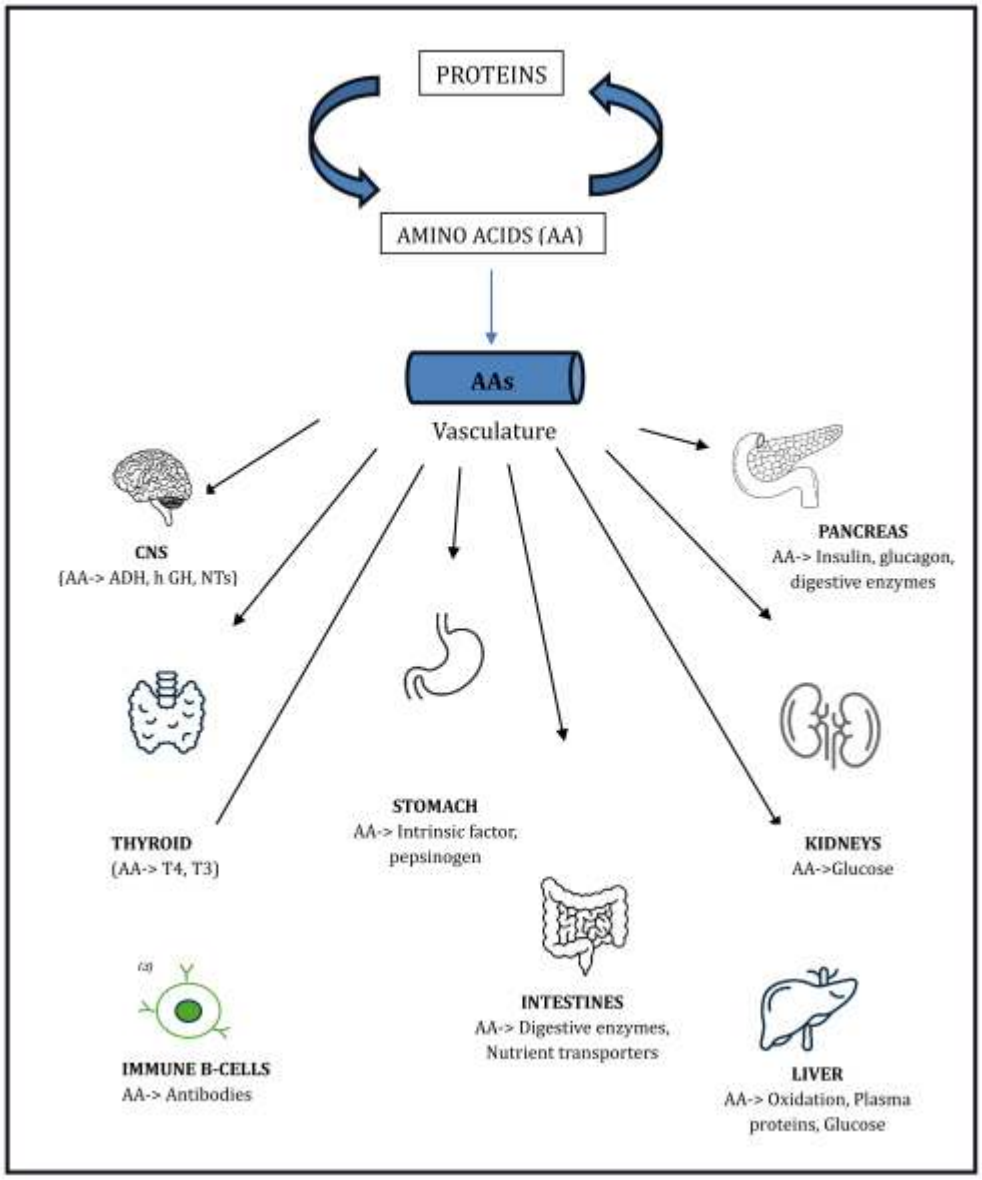

Fig: Safety evaluation sequence[6].

It is by now a well known fact that we need to take the nine essential amino acids through the diet since our body cannot synthesize these endogenously. For the general well-being, current dietary protein recommendations are derived across age groups considering the indispensable amino acid requirements, detailed meta-analyses documenting the nitrogen balance data, adequate nitrogen and protein requirement observations and definitely the safe levels. For an healthy Indian adult, 0.66 g/kg/day is estimated average requirement, while 0.83g protein/kg/day is deemed as recommended dietary allowance. In addition to this experts have also indicated an acceptable macronutrient distribution range (AMDR) does provide for more flexibility in dietary protein intake recommendations in the context of the complete diet[4]. While these values help us with a safe and adequate level arrivals, there are certain situations like the ageing population, who would need a bit higher levels of protein (Figure 2). It is estimated that the ageing population (>65 years)[1] would require at least 1.0-1.2g protein/kg b.w./day along with daily physical activity as long as possible, to meet their adequate protein requirements and help spare the muscle mass.

While the above details are applicable for general well being, there are special conditions where the protein requirements vary from the normally suggested adequate levels. For example in someone who is involved in an intense physical activity or exercise or in athletes. While the data around this field is not only vast but a fast growing one too! We will restrict to few examples to look at varied requirements within these situations itself. Protein is not stored as a reserve and daily protein intake should match daily protein metabolism to satisfy daily protein requirements.

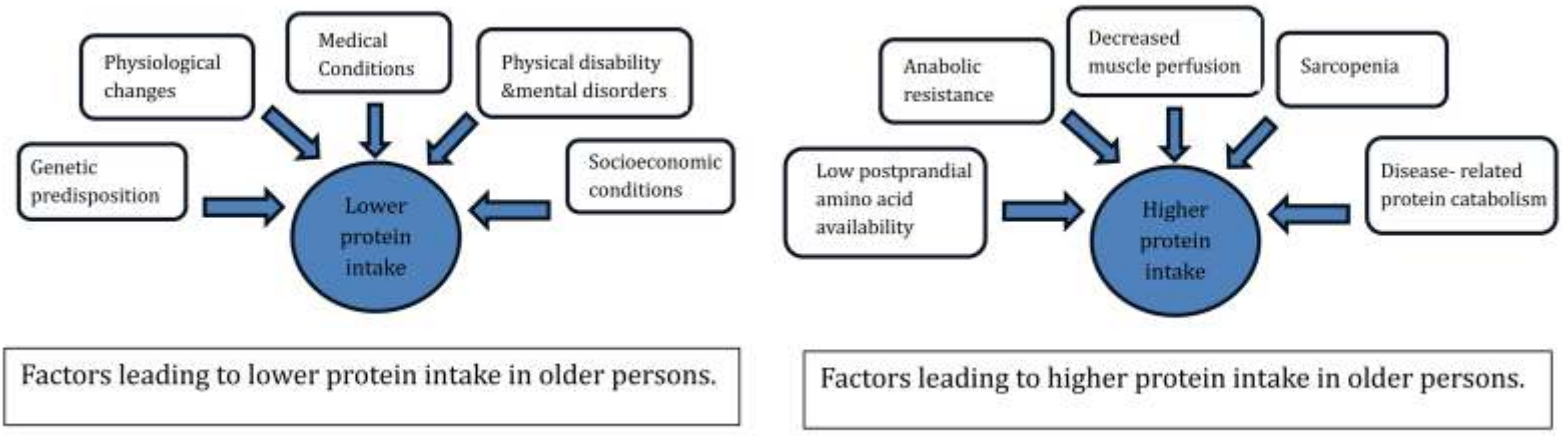

Fig: Safety evaluation sequence[6].

Consuming a higher protein diet (2.4g/kg/d vs. 1.2g/kg/d) during energy deficit (~40% reduction in energy intake compared with requirements) while performing intense resistance exercise training and high intensity training was shown to augment lean body mass over a 28-d period in recreationally active young men[5].Not just quantity but effects of different kinds of protein and their timing of consumptions have also been evaluated. There was a better myofibrillar protein synthesis i.e., 40g stimulated MPS to a greater extent than a 20g whey protein isolate during acute (0–300 min) exercise recovery in young, resistance-trained males[6] when consumed immediately after exercise. Further, recent research is also exploring the combination of protein with other macronutrients like carbohydrates for benefitting certain kind of performances. A meta-analyses including such studies observed that compared to carbohydrate alone, co-ingestion of protein and carbohydrate during exercise demonstrated an ergogenic effect on endurance performance in above points[7].

On the other hand, there are certain health or pathological conditions(Eg: Chronic kidney disease (CKD)) that may need one to reduce the protein intake depending upon the medical examination. The kidneys have an important role in the synthesis, reabsorption, metabolism and excretion of amino acids and their products[8]. Low protein diets have been proposed for patients with CKD with the aim of slowing the progression and delaying the onset of renal replacement therapy. Nephrologists and dieticians suggest a low or very low high biologic-value protein diets in such conditions to reduce the pressure on the kidneys for renal clearance.

Very low protein diets are frequently supplemented with essential amino acids and nitrogen free keto-analogues of amino acids to reduce the risk of malnutrition[9]. It is very important to keep in mind that careful monitoring of clinical and biochemical markers are needed to avoid nutritional deficiencies under such conditions.

In conclusion, protein, an essential macronutrient that is not stored in the body as a reserve are energy macronutrients providing nitrogen, amino acids and energy.

Utilization of protein is dependent on adequate intake of energy and micronutrients. Recommended intake of protein to should be accompanied by a balanced diet that meets all the micronutrient requirements. Nutritive value of proteins from food and diet depends not only on the amount of protein, but also on the amino acid composition, concentration, and on bioavailability of protein-derived nitrogen and amino acids. There are diversified benefits from protein consumption depending upon the quality, quantity, accompanied with and timing of the protein consumption. It is not the same across conditions, ages or stages of life. Always have a judicious approach, and in situations which need specific kind of protein / or levels, it would be appropriate to consult a physician/dietician/nutritionist or a person such before consumption.

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RETHINKING MAXIMUM RESIDUE LIMITS (MRLS) FOR FOOD CONTAMINANTS: A HUMAN HEALTH IMPACT APPROACH

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The contamination of food with agrochemical residues and contaminants from soil and water has long been a significant public health concern. To safeguard consumers, Maximum Residue Limits (MRLs) are established, ensuring that the levels of these contaminants in foodstuffs remain within safe bounds for human consumption.

Traditionally, MRLs are determined based on human exposure, dose response, and health effects, which are considered the most reliable science-based approaches.

The 2011 Food Safety and Standards (Contaminants, Toxins, and Residues) Regulation in India sets Maximum Residue Limits (MRLs) for contaminants in food products. These limits are primarily based on field trial data from the Central Insecticides Board and Registration Committee (CIB&RC) under the Ministry of Agriculture and Farmers Welfare (MAFW) (1,6). When field trial data is unavailable, MRLs are derived from the MAFW's Monitoring of Pesticide Residues and National Level (MPRNL) scheme. However, due to insufficient field trial data, most pesticides in India lack scientifically established MRLs (2). Due to the lack of prevalence data and

advancements in analytical technologies, MRLs are often set based on a zero-tolerance approach, defined by the limit of detection (LoD) or limit of quantification (LoQ), usually set at the default of 0.01mg/kg. This stringent method places immense pressure on traditional food systems that rely on plant protection chemicals and other agrochemicals for meaningful crop yields. Also, farmers depend on varying water supplies whose quality is often beyond their control.

Challenges in Agriculture

Climate change is intensifying the challenges faced by agriculture. Farmers are encountering more resilient pests, soil erosion, and growing dependence on groundwater and treated wastewater. As a result, the frequency of contaminant residues in food commodities is on the rise. The zero-tolerance approach to MRLs further compounds these issues, putting both food security and farmers' livelihoods at risk. Below is an example and case study that underscore the critical need for plant protection chemicals in modern farming.

In 2022, chilli farmers in Andhra Pradesh, India, faced a severe thrips infestation that threatened to devastate their entire crop. As a last resort, farmers turned to Spinosad, an effective pesticide against thrips, to save their crop and prevent further economic losses. However, the use of Spinosad posed challenges due to India's strict MRL of 0.01 mg/kg for the pesticide. Additionally, the reliance on groundwater and treated wastewater, which may contain pesticide residues, further complicated the situation.

The Food and Agriculture Organization (FAO) sets the acceptable daily intake (ADI) of Spinosad for a healthy adult at 0.02 mg per day per kilogram of body weight. Assuming an MRL of 0.1 mg/kg (10 times higher than the current limit) and an average daily consumption of 3 grams of dry chillies per person, the total pesticide exposure would be just 0.0003 mg per day, providing a safety margin of about 66 times. This safety margin accounts for potential additional exposure to Spinosad from other food sources. To reach the ADI for Spinosad, a healthy adult weighing 60 kg would have to consume 1.2 kg of dried chillies in one day, a practically impossible amount.

According to the Spinosad General Fact Sheet by the National Pesticide Information Centre (NPIC), Spinosad has low toxicity to humans and mammals and is approved by the U.S. Environmental Protection Agency (EPA) for use in organic agriculture. It is also used in FDA-regulated products for controlling head lice in humans and fleas on pets. Most people are exposed to very low levels of Spinosad through their diet, particularly from consuming treated fruits and vegetables. Studies have shown that Spinosad has no observed adverse effects in rats even at doses of up to 10 mg/kg/day over two generations. The EPA classifies Spinosad as unlikely to cause cancer, based on long-term cancer risk studies. Additionally, Spinosad rapidly degrades in sunlight, with half-lives ranging from 2 to 16 days on leaves and less than a day in water. It adheres to soil, with minimal leaching, and is broken down by microbes in the topsoil.

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- Oil seed, oils and its produts
- Sweets.,confectionary and its products
- Bakery products
- Sugar, Honey & jaggery
- Process, canned food products
- Feeds
- Water
- Ready to eat
- Infant substitute
- Skim Milk Powder

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- Natually occurring toxins(NOT,s)
- Heavy metals and minerals
- Minerals & Toxic heavy metals
- Vitamins
- Antibiotics / Residues
- Food Adulteration tests
- Food additives, preservetives and artificial sweetners
- Synthetic food colour
- Antioxidents
- Packaged Drinking analysis as per IS 14543
- Drinking water as per IS 10500
- Process water IS 4251
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Given these factors, there is a clear opportunity to review MRLs while maintaining consumer safety. The current zero-tolerance approach to MRLs, however, could result in the rejection of produce with pesticide residues even slightly above the LoQ-based limits, which would negatively impact farmers' market access and the chilli processing industry.

A paradigm Shift

To address these challenges, this article advocates for a shift from the current zero-tolerance or LoD-based approach to a more nuanced, health impact-driven framework for determining MRLs of food contaminants.

This shift would prioritize assessing the actual health risks posed by contaminants, rather than focusing solely on their mere presence at detectable levels.

Incorporating Toxicological Data

To establish MRLs that are both scientifically robust and protective of public health, it is crucial to base these limits on comprehensive toxicological data, which are already available for most of the pesticides and other contaminants.

This includes evaluating the dose-response relationship of the contaminant, determining the No Observable Adverse Effect Level (NOAEL), and applying appropriate safety factors to account for uncertainties and variability among different human populations (6).

Where there are data gaps, non-animal testing methods, such as in vitro approaches, in silico modelling, high-throughput screening (HTS), and Integrated Approaches to Testing and Assessment (IATA), can be valuable tools for generating toxicological data(11,12).

A scientifically rigorous process for determining MRLs would include the following steps:

- Determine the NOAEL for the contaminant through a thorough review of field data and established scientific literature.

- Conduct an exposure assessment to evaluate the likelihood of different population groups encountering the contaminant through food consumption.

- Perform risk characterization by integrating toxicity and exposure data, leading to the derivation of an Acceptable Daily Intake (ADI).

- Set MRLs based on the ADI, ensuring that the levels allowed in food do not result in exposure exceeding the ADI(7).

FSSAI Adopts Risk-Based Approach for MRLs in Spices and Herbs

In April 2024, FSSAI issued an order to align India's Maximum Residue Limits (MRLs) for pesticides in spices and culinary herbs with the Codex Alimentarius guidelines. For pesticides registered with the Central Insecticides Board and Registration Committee (CIB & RC) that also have established MRLs by Codex and are adopted by the EU, U.S., Japan, Australia, and New Zealand, the Codex MRLs will apply.

FSSAI stated that its scientific panel on pesticide residues thoroughly evaluated data provided by the CIB & RC to determine appropriate MRLs for various food commodities, including spices. India has registered over 295 pesticides, with 139 approved for use in spices alone. These pesticides are subject to different MRLs based on crop-specific data and risk assessments.

Additionally, FSSAI emphasized that India maintains some of the world's strictest MRL standards. In response to repeated requests from industry stakeholders, a revision of MRLs for spices was announced, setting the limit at 0.1 mg/kg for those pesticides not registered by CIB & RC in India. This revision, recommended by the Scientific Panel on Pesticide Residues (which includes members from CIB & RC and the project coordinator of the Monitoring of Pesticide Residues at National Level, MPRNL, under the Ministry of Agriculture), was based on the adoption of similar MRLs by the Codex Alimentarius Commission for various spices globally. These MRLs, which range from 0.1 to 80 mg/kg, have been implemented in a phased manner between 2021 and 2023 (8).

Benefits of the Human Health Impact / Toxicological Risk Assessment based approach

1. Balanced Regulation: By considering human health impacts, dose, and exposure, MRLs can be set at levels that are scientifically justified and protective of public health by being stringent only for unsafe contaminants. It is of national interest that the safety data is made available deploying non-invasive testing methods or meticulous evaluation of literature on safety for specific crops.
2. Support for Farmers: This approach would alleviate pressures on farmers, allowing them to use necessary agrochemicals responsibly and ensuring their crops can be grown and sold without undue regulatory burdens.
3. Enhanced Food Security: By enabling farmers to maintain meaningful crop yields, this approach supports the food security of nations, ensuring a stable supply of safe food.
4. Adaptability to Climate Change: A health impact-based approach is more adaptable to the changing conditions brought about by climate change, such as the emergence of new pests and the need for alternative water sources.

The Essential Role of Plant Protection Chemicals in Modern Agriculture

Plant protection chemicals are essential in modern agriculture, helping to control pests and diseases that can devastate crops. As the global population continues to grow, the demand for food will increase, making the continued use of pesticides necessary to ensure a stable food supply. While contaminants may always be present in food commodities at residual levels due to environmental factors, it is vital that the established MRLs are realistic and achievable for farmers. MRLs based on the limit of quantification (LoQ) present several challenges. As advancements in analytical technology lower LoQs, compliance becomes increasingly difficult, potentially causing economic hardship for farmers and disruptions in food supply chains.

Conclusion

Indian agriculture and food systems face numerous challenges, including the impacts of climate change, poor water quality, and deteriorating soil health. To sustain food production in the face of these challenges, the use of agrochemicals, including plant protection chemicals, is essential.

Consequently, residues of these chemicals in food systems are inevitable. Regulatory bodies often adopt a zero-tolerance approach to setting MRLs based on limits of detection (LoDs), creating a dilemma for food production.

A science- and risk-based approach to determining MRLs can ensure human safety without compromising agricultural productivity. Human safety data, including acceptable daily intake (ADI) values for most food contaminants, are likely already available. By leveraging this data, a comprehensive review of MRLs across all food commodities could be conducted, allowing for the establishment of revised, safe MRL levels. It can be done through collaboration among academia, industry, and regulatory bodies to develop more effective and practical standards.

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POSTBIOTICS: POTENTIAL FUNCTIONAL FOOD INGREDIENTS

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The human large intestine harbours about 200 species of bacteria, fungi, and viruses. (1) They are known as gut microbiome. Some of these bacteria are harmful to our health, while many are useful for our well-being. The gut environment mainly depends on our eating habits. The importance of gut health is becoming a significant research topic for the medical fraternity. Gut health has links with many ailments like mental health, autoimmune diseases, type 2 diabetes, irritable bowel syndrome, inflammatory bowel disease, cardiovascular disease, cancer, and sleep disorders. Gut health is affected by many factors other than food such as; lack of sleep, stress, less physical activity, consumption of antibiotics, smoking, and drinking alcohol. Consuming whole foods including vegetables, legumes, breads, cereals, nuts, and seeds is important to maintain proper gut health.

The impaired gut health can be treated by various means. (2)The Most accepted treatment for any disease is by synthetic drugs,which is the contemporary strategy providing vital therapeutic solutions. The synthetic molecules prepared by the use of molecular biology and chemistry, are capable of targeting aberrant pathways with remarkable specificity. However, diseases occurring because of gut microbiome disturbances require multifaceted interventions. Synthetic drugs often give symptomatic relief. Moreover, synthetic medicines, particularly broad-spectrum antibiotics that attack non-specifically,actually aggravate issues related to gut dysbiosis.This necessitates, that the problem of gut microflora needs a more inclusive approach.

The importance of prebiotics, probiotics, and postbiotics is getting attention because of their ability to promote health and control disease through the modulation of gut bacteria. Probiotics are live bacteria that provide health benefits when consumed in adequate quantities. Prebiotics are nondigestible substances that promote the growth of beneficial bacteria. They are food for these microbes. Prebiotics are a substrate specifically digested by the host microorganisms, giving health advantages.

They are found in dietary fibers, phenolics, phytochemicals, human milk polysaccharides, and various oligosaccharides. A symbiotic mixture of pre and probiotics helps colonisation of healthy bacteria offering health benefits.

The postbiotics were defined by ISAPP (International Scientific Association for Probiotics and Prebiotics) in 2021, according to which it is the preparation of inanimate microorganisms and/or their components that confer a health benefit on the host. They include a wide range of components, such as inactivated microbial cells, cell wall components, functional proteins, peptides, Short Chain Fatty Acids (SCFAs), polyamines, vitamins, bacteriocins, and other bioactive metabolites. Whereas, postbiotics are the metabolites produced by probiotics.

Postbiotics are classified as metabolites generated by microbiota. (3). As mentioned above, this includes SCFAs, exopolysaccharides, cell wall fragments, enzymes/ proteins, and other metabolites. (Fig 1)

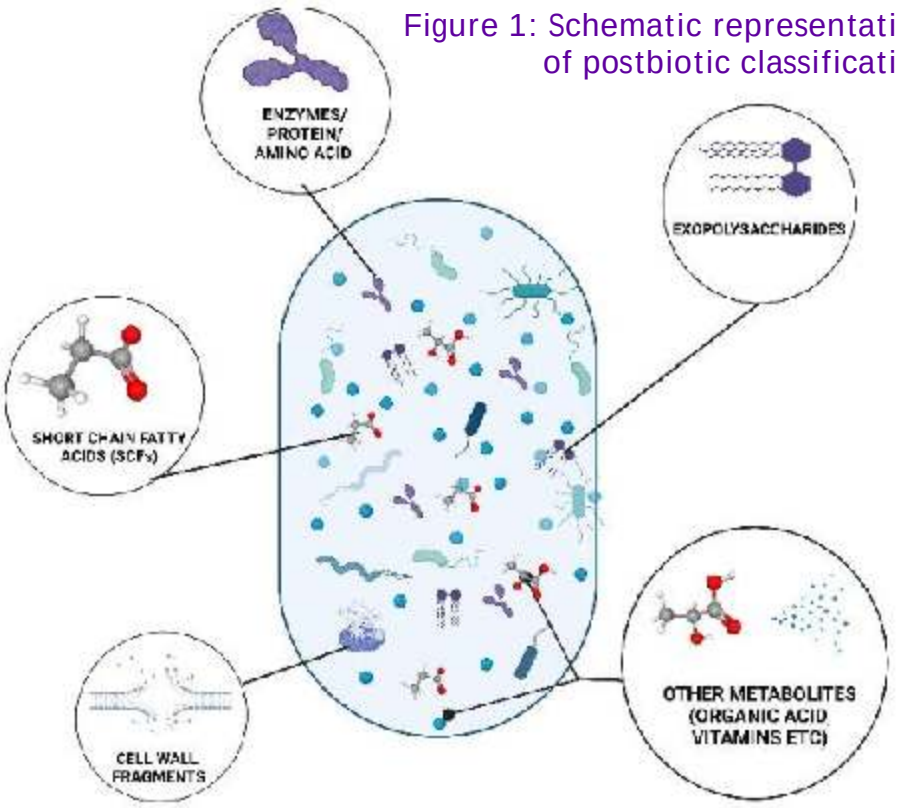
Short-chain fatty acids (SCFAs): They are important metabolites produced by the fermentation of plant polysaccharides. Inulin or FOS are fermented to SCFAs. Butyric acid is one of the important trophic sources for enterocytes as it aids in regenerating the intestinal epithelium. It also has anti-inflammatory properties. Propionate also shows an anti-inflammatory effect.

Exopolysaccharides (EPS): They are branched, repeating units of sugars or sugar derivatives that are long-chain, high-molecular-weight polymers and are produced by mostly lactic acid bacteria. They wrap most bacterial envelopes and play a major role in cell adhesion and protection. They are important because of their immunomodulatory, antitumor, antimutagenic, antioxidant, anti-inflammatory, antihypertensive, antibacterial, antiviral, cholesterol-lowering, and anti-gastrointestinal activity.

Enzymes: Different enzymes belonging to the following six classes are part of postbiotics: oxidoreductases, transferases, hydrolases, lyases, isomerases, and ligases. These enzymes play physiological, biochemical, and regulatory functions.

Cell wall fragments: Several cell wall bacteria components are immunogenic. Lipoteichoic acid teichoic acid forms 60% of the cell wall component of gram-positive bacteria.

Figure 1: Schematic representation of postbiotic classification



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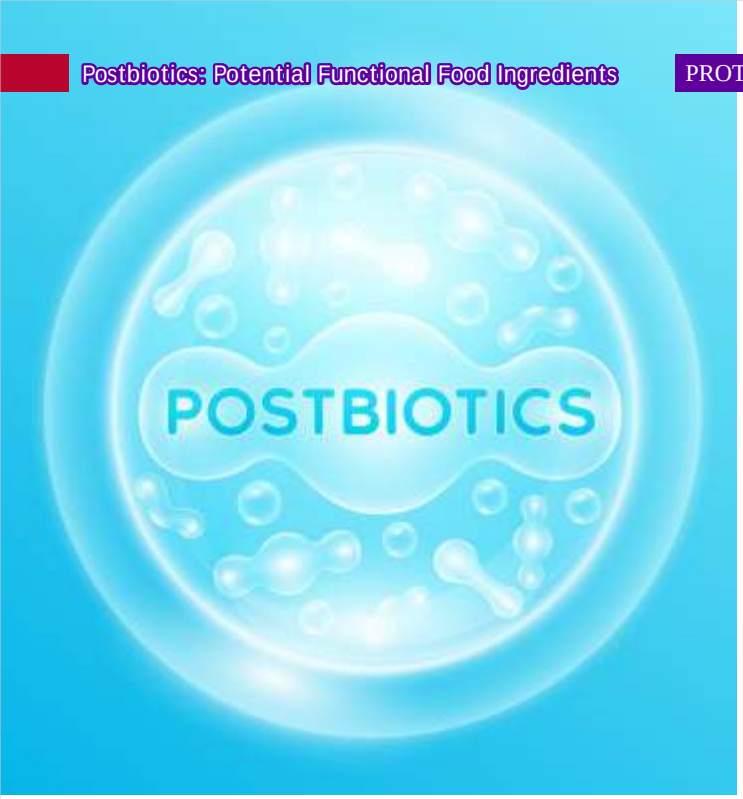


Cell-free supernatants (CFS): These are liquids that contain metabolites left behind from microbial growth and any unabsorbed nutrients from the growth medium. They have anti-inflammatory, anti-tumor, and antioxidant properties and are also used to treat diarrhoea. CFS produced by Lactic Acid Bacteria have antibiotic activity because of organic acids, proteinaceous molecules, and fatty acids.

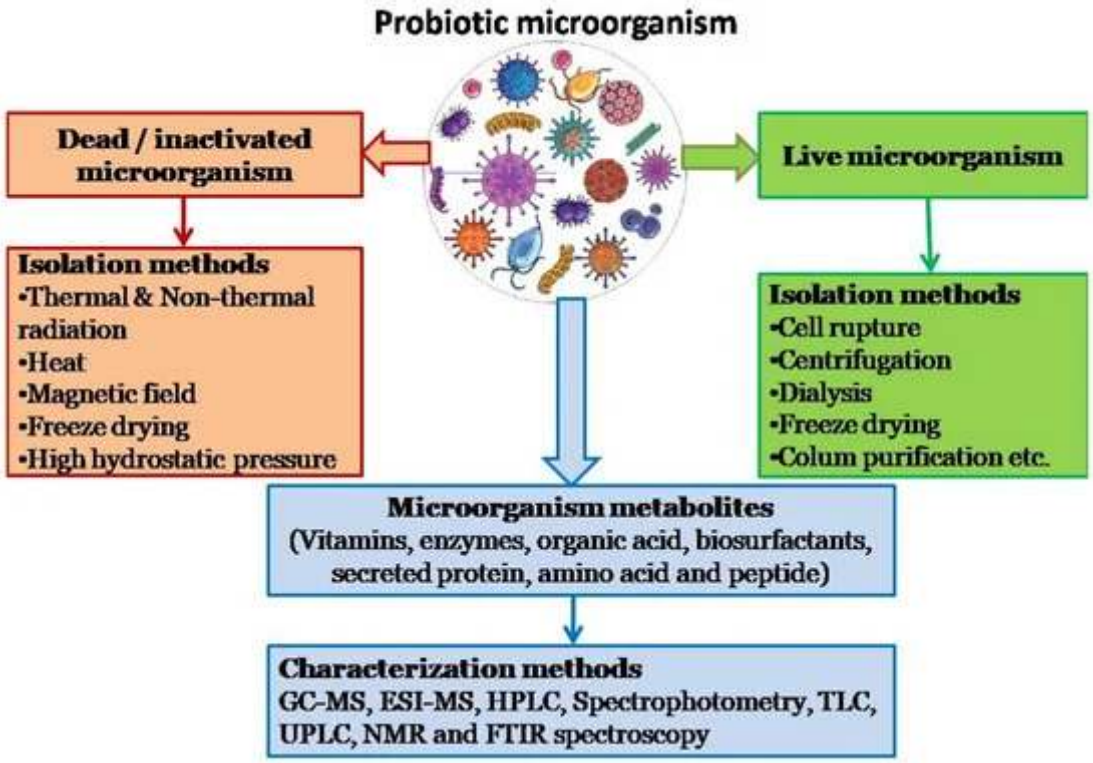
Bacterial lysates: They are made from broken-down bacterial cells and stimulate the immune system to recognise and fight infections. Recently they have been found to be useful in lowering recurrent respiratory tract infections in children and their effectiveness on chronic obstructive pulmonary disease.

Other metabolites: These include vitamins, aromatic amino acids, and phenolic-derived compounds. The gut microbiome can produce B-group vitamins, including B12, B2, B6, B9, and vitamin K.

Production, purification, and characterisation of Postbiotics: (4) Postbiotics are found naturally in several fermented foods like yogurt, sauerkraut, pickled vegetables, and kombucha, and are produced by various bacterial and fungal species, the strains of which mainly include those of Lactobacillus, Bifidobacterium, Streptococcus, Eubacterium, Faecalibacterium, and Saccharomyces. The amount of postbiotics in natural fermentation cannot be controlled and even the quantities are insufficient to generate a physiological response in vivo. Scientists have developed techniques to produce them in sufficient amounts so that they can be used in food, pharmaceutical, and nutraceutical applications.

Modern technologies are used to manufacture, characterise, and examine the bioactivities of various postbiotic components in preparation for potential therapeutic applications in medicine. Generally, postbiotics are stable and do not require cold chains for industrial use. They do not interact with the food matrix or develop antibiotic resistance genes and do not impart any taste to the food matrix. That is why they make perfect supplements for patients with immunological weaknesses after transplantation and in babies. They act systematically by communicating between the gut and the target organ through gut-brain, gut-liver, and gut-lung axes. The type and quantity of postbiotics produced depend upon factors like probiotic bacterial culture, growth medium, and the treatment to be given after the growth. Postbiotics are soluble components and metabolites produced during bacterial growth. After fermentation, the bacteria are subjected to lysis by using techniques such as thermal, chemical, enzymatic, sonication, high pressure, solvent extraction methods, or a combination of these. Additional purification techniques like centrifugation, column separation, dialysis, and lyophilisation are used to separate postbiotics from treated and untreated postbiotic mixtures.

Figure 2. Production, purification, and characterisation of postbiotics



Given the complexity of these biological compounds, they can be characterised by analytical methods such as chromatography, spectroscopy, NMR, Fourier transform, IR absorption spectroscopy, and spectrophotometry. All these production, purification, and characterisation of postbiotics are depicted in Figure 2.

Application in Foods: (4), (5) Off-late, functional foods based on prebiotics, probiotics, and postbiotics are receiving attention from researchers, manufacturers, and consumers. Postbiotics are stable over a wide range of pH and temperature which makes them suitable to add to the meals or products before thermal processing. The right amount of postbiotics can be managed under manufacturing and storage conditions making them suitable to be used in delivery systems such as pharmaceutical goods and/or functional meals. Some of the examples of postbiotics are bacterial lysates containing cell surface proteins, enzymes, peptides, metabolites, neuropeptides, and lower organic acids. They are naturally present in many dairy products such as kefir, kombucha, yogurt, and pickled vegetables. Generally, Lactobacillus species, Bifidobacterium, Saccharomyces, Bacillus, Streptococcus, or Faecalobacterium genera are highly effective postbiotic-producing microorganisms in the form of cytoplasmic extracts and cell wall components.

Yeasts can provide a variety of beneficial postbiotics like polyamines, acetic acid, cinnamic acid, proteases, bioactive proteins, B vitamins, and phenolic compounds some of these can improve the bioavailability of nutrients. Purified phytase from Bifidobacterium spp. Infantis, and Bifidobacterium pseudocatenulactum, could reduce phytate content and raise inositol triphosphate levels in cereal combinations.

A cell-free supernatant of L. plantarum ATCC 14917 was used to prepare antibacterial packaging paper that could effectively inhibit Listeria monocytogenes of minced meat. Lactarius Volemus polysaccharide extract can significantly increase the essential amino acids production in yogurt and the water retention capacity of lactic acid bacteria, shortening the fermentation period of yogurt.

Postbiotics not only inhibit pathogenic organisms but also inhibit spoilage organisms making them useful in food preservation.

Because of their inanimate nature, postbiotics present a lower risk. The preparation, storage, and transportation are less challenging. This makes their scope of use much broader. However, the lack of a regulatory framework and safety data limits the development and applications.

Therefore, animal studies or clinical trials are required to explore their effects on immunodeficient populations. More studies are necessary to understand the mechanism of action in the hosts. Safe dose range studies are required to decide on the safe use of postbiotics.

This functional food ingredient has great market potential. (6)The postbiotic supplements market is estimated to be valued at USD 10.8 million in 2024.

With the rising awareness about the health benefits of products, the demand for postbiotic supplements is expected to register a CAGR of 10.9% from 2024 to 2034, reaching a valuation of USD 30.5 million by 2034.

Postbiotics are wonderful natural substances that have the potential to support health, therefore they can be used in functional foods. As aningredient,they may have many applications in food product development and preservation.

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INDIAN SWEETS: BRIDGE BETWEEN TRADITION & NUTRITION

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The phrase "Chalo Kuch meetha hojaye" is common in our homes during any celebration or get-together, reflecting how sweets unite people across cultures. Sweets are an essential part of celebrations, with a natural fondness for sweetness shaped by cultural and personal preferences.

In 2022, India became the world's largest producer and consumer of sugar. The World Health Organization (WHO) recommends that both adults and children limit free sugars to less than 10% of their total energy intake. Many people rely on foods that contain sugar directly or indirectly, leading to significant daily calorie consumption. Excessive sugar intake is linked to various health conditions, with fructose rather than glucose being a major contributor to negative health outcomes. High consumption can result in fat accumulation, insulin resistance, and metabolic syndrome. While the average sugar intake in India may be close to recommended levels, some individuals consume much more, which can lead to numerous health problems. Other factors such as lack of physical activity, carbohydrate-rich diets, and genetics also contribute, but reducing sugar consumption is crucial for better health.

Traditional Indian sweets, often made with cereal/pulses/vegetables, milk, sugar, and ghee, reflect regional tastes but can be high in calories due to refined sugar and fat. As health awareness rises, there's a shift towards healthier versions of these sweets, such as using dark chocolate or natural sweeteners, to reduce sucrose consumption without sacrificing flavour.

Dairy options that can be used

Traditional sweets often use full-fat milk or cream, which contributes to high saturated fat content. Choosing low-fat or skim milk can reduce saturated fat and calorie intake, helping to lower obesity and cardiovascular risks while still providing essential protein, vitamins, and minerals.

Marketing these sweets as "low-fat" or "reduced-fat" can attract health-conscious consumers. Skim milk powder (SMP) is often used as a substitute for fresh milk in sweets, but it tends to have a powdery taste and lacks a pleasant mouthfeel. There is also loss of water-holding capacity as proteins are denatured in drying. The insufficient fat content in skim milk powder prevents proper consistency, so it's essential to add fat and flavour to improve the outcome. Using lower-fat milk is preferable to SMP, as it contains some fat, making it a better option for recipes.

As fat contributes to the creaminess, appearance, palatability, texture, and lubricity of foods and increases the feeling of satiety, removing it can impact their flavour, consistency, and overall quality. Sweets like Peda, Barfi, and Kalakand, for example, depend on the full-fat milk's richness and smoothness, reducing fat makes them less creamy, crumbly or dry.

This problem can be tackled by using fat replacements. Skim milk or SMP when combined with other thickeners or fat replacements, helps produce a mouthfeel and body that are comparable to full-fat milk. For example, Gulab jamun mix powder is formulated from skimmed milk powder, vanaspati (addition of trans-fat might be a drawback) or ghee, refined flour, semolina, baking powder and ground cardamom (1).

Some fats may be replaced in foods by reformulating them with selected ingredients that provide some fat-like attributes. Fat replacers can be categorized into lipid, protein, or carbohydrate-based types and may be used individually or in combinations. There are two main types: fat mimetics and fat substitutes. Fat substitutes resemble lipids and have similar chemical structures, providing fewer calories or being indigestible. In contrast, fat mimetics, are common food components, such as starch and cellulose. They can be chemically or physically modified to replicate the functions of fat.

They are primarily derived from proteins or carbohydrates, have different chemical structures but mimic certain qualities of fat, such as viscosity, appearance, organoleptic properties like taste, mouthfeel, and texture and physical properties of triglycerides, but they cannot replace fat on a one-to-one, gram-for-gram basis The caloric value of fat mimetics typically ranges from 0 to 4 kcal per gram. These substances tend to absorb a significant amount of water, which makes them unsuitable for frying, as they can bind excessive water and can denature or caramelize at high temperatures.

While protein-based fat mimetics can enhance low-fat foods, their use in the food industry is limited due to their propensity to denature and coagulate at high temperatures. Therefore, the processing of protein-based fat mimetics is primarily restricted to baking and retorting methods.

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Additionally, incorporating lipophilic flavours into foods formulated with fat mimetics often requires the use of emulsifiers (2).In Dairy desserts, Dextrins are used, it is a carbohydrate-based fat replacer made from the starches extracted from tapioca, corn, potato, and rice. They are known for their ability to mimic several fat sensations, including mouth coating, the melting sensation, and the richness of fat.

Another one is Salatrim (a modified triglyceride), which has an energy density of 5 kcal/g and offers stabilizing properties along with flavour, body, mouthfeel, and texture(3). In 2003, the EU (European Union) authorised using salatrim as a novel food ingredient in bakery products and confectionery.

However, it is not yet permitted by FSSAI.

Yoghurt or Greek yoghurt is also an upcoming ingredient used by food professionals. It has a low glycaemic index and is a healthier option for high-protein, low-carb desserts because it is thicker and creamier due to the straining process that extracts whey. Greek yoghurt has more protein and less sugar than regular yoghurt because it is concentrated. For rich desserts like shrikhand, where a thick and smooth consistency is preferred, this makes it ideal. It gives a smooth texture without requiring extra thickening agents. Regular yoghurt, on the other hand, is thinner and contains more water. Recipes that call for a lighter consistency or cooking and reducing yoghurt, such as mishti doi, can be used.

Alternatives to refined sugar:

It's crucial to consume sugar and sweeteners in moderation, regardless of their origin.

Jaggery is a traditional sweetener commonly used in desserts like kheer and payasam, providing a caramel-like flavour. It's an excellent source of iron about 11 mg of iron (61% of the RDA) and magnesium 70–90 mg of magnesium (17–22% of the RDA) per 100 grams. It contains beneficial phenolic acids from molasses, which are removed during the processing of refined sugar. As interest in healthier sweeteners grows, jaggery-based sweets can appeal as a traditional and health-oriented alternative. However, as the calories are more or less equal, these nutrients can also be directly fortified into the product. This makes it possible to precisely regulate the amount of iron and magnesium that are given to each serving. This guarantees that the product continuously satisfies the desired nutritional standards. Plus, not everyone may like jaggery's flavour and colour profile. Consumers who prefer additional health advantages without a strong, earthy flavour may be drawn to fortified sweets made with refined or neutral-tasting sweeteners (4).

Another innovative concept is using dried sugarcane juice as an alternative to jaggery and refined sugar, as it retains all essential flavour components, sugars, proteins, minerals, vitamins, and antioxidants. Research from the ICAR-Sugarcane Breeding Institute indicates that its composition is comparable to fresh sugarcane juice, making it suitable for instant juice preparation and as a regular sweetener (5).

Additionally, this product serves as an excellent flavour enhancer for various food items, including sweets, baked goods, and dairy products. It may offer more micronutrients than jaggery, without the undesirable colour and flavour changes associated with the traditional jaggery-making process. However, the drawback is that it can be costly since current demand and production levels are low.

Honey enhances flavours and offers health benefits, such as a lower glycaemic index and higher antioxidants; for example, it is used in nut brittles. It is mainly used by small-scale producers and households due to its high cost and potential impact on the taste and moisture of traditional sweets. While environmental factors can affect production consistency, the demand for natural sweeteners may expand honey-based sweets beyond niche markets. Innovations in food technology could optimize honey usage in recipes, with some producers blending it with sugar or jaggery to balance cost and flavour.

The use of dates as a sweetener in Indian sweets is becoming popular due to their rich flavour and nutritional benefits, including fiber, potassium, and magnesium. Many brands now use dates or date paste in products like energy bars, halwa, chikki, and ladoos. However, incorporating dates increases production costs, and factors like seasonality and import regulations can affect availability.

Coconut sugar is becoming a popular sweetener due to its trace nutrients like iron, zinc, calcium, and potassium, as well as antioxidants. Its rich, caramel-like flavour enhances traditional Indian sweets made with ghee and milk. However, challenges include higher costs, supply chain issues, and necessary recipe adjustments for moisture content. It's marketed mainly to health-conscious consumers seeking organic or natural sweeteners.

Stevia is a popular calorie-free sweetener that has a strong sweetness (200–400 times sweeter than table sugar), and only a small amount is needed to match the sweetness of sugar but this changes the composition and texture of the sweets. It remains stable under high temperatures, making it suitable for cooking and baking. Stevia does not contribute bulk or viscosity as sucrose does, potentially resulting in lighter or less dense textures. In Indian sweets like rasgulla or gulab jamun, where sugar contributes to syrup texture, a bulking agent might be necessary. It can combine well with sugar alcohols or FOS to mimic sugar's functional properties.

A study compared the sensory analysis of three traditional Indian sweets (motichoor ladoo, gulab jamun, and jalebi) made with Agave syrup and Stevia instead of sucrose. Results showed that Motichoor Ladoo made with Stevia had the highest acceptability and closely resembled the sucrose version.

Jalebi made with Agave syrup was preferred over the Stevia version, which had the lowest scores due to a strong aftertaste. For Gulab Jamun, stevia was preferred over agave, with appearances similar to sucrose(6). Giri et al. studied stevia as a sucrose substitute in kulfi, finding that up to 50% of sugar can be replaced without compromising sensory qualities (7).

Even FOS (fructo-oligosaccharides) are used primarily as a low-calorie, alternative. FOS is a mildly sweet, prebiotic fiber that supports gut health, hence can be a good addition. It can affect the texture of sweets and is soluble. It may enhance moisture retention in some recipes, giving them a softer, chewier texture. As per the FSSAI classification, it is a dietary fiber and hence won't require any bulking agents. However, since these elements impact the shelf life and quality of sweets like ladoos and barfis, their impact on crystallization and water activity should be assessed. A few artificial sweeteners, especially saccharin sodium, aspartame, acesulfame potassium, and sucralose, have been certified by FSSAI for use in traditional sweets.

Bulking agent is used when sugar is replaced with stevia or artificial sweeteners. Polydextrose is a synthetic glucose polymer that tastes neutral and has a feel similar to sugar. Sweets like ladoos, barfi, and halwa that require a chewy or dense texture work well with it. A variety of sweets are given body and structure by maltodextrin, which is made from starch. Inulin is a naturally occurring soluble dietary fiber that has prebiotic qualities and can be utilized as a bulking agent. It has a soft and moist feel that works well in sweets like modak, barfi, and coconut-based desserts. To get the appropriate texture and bulk, additional agents such as erythritol, glycerol, and modified starch are frequently utilized, or a combination of these is sometimes used. Maltodextrin was found to be the most suitable bulking agent in the preparation of artificially sweetened misti dahi using aspartame and acesulfame-K (8). The typical mouthfeel, structure, and texture of Indian sweets can be preserved by selecting the appropriate bulking agent or using blends. Consumer preferences, manufacturing scalability, and the particular kind of sweet should all be taken into account.

Conclusion:

Indian sweets are celebrated for their rich flavours and cultural significance, yet some can be modified to better align with modern health priorities by enhancing their nutritional profiles. The packaged Traditional Indian sweets market reached INR 5320 Cr in 2022 and is projected to grow to INR 15,057 Cr by 2028 (9). The preference for hygienically made and packed sweets has contributed to this expansion, indicating a bright future for Indian traditional sweets. When reformulating a traditional sweet to make it healthier, it often changes the texture, appearance, and mouthfeel. Most people, except for diabetics, who need to avoid sugar, will not accept these changes unless the new product is very similar to the original. Only small changes are usually acceptable; otherwise, the product may not succeed in the market, even if it is healthier.

Many traditional sweets contain nutrient-dense ingredients: laddoos made from besan or dal provide protein and can be enriched with nuts, while halwas featuring moong dal or whole wheat offer both fiber and protein; likewise, til ladoos and peanut chikkis provide healthy fats. To create more nutritious options, recipes can incorporate pulses and legumes to boost protein and fiber, replace refined flours with whole grains, oats use Greek yoghurt for creaminess and protein, add functional ingredients like FOS for fiber while lowering glycaemic index and slow down sugar release.
Sugar and fat play a big role in the texture and mouthfeel of sweets. The article suggests using substitutes that mimic these qualities without losing sensory appeal. Combining traditional and alternative ingredients can help balance health benefits and sensory satisfaction. However, this remains a challenge for R&D teams and they should refine recipes based on consumer feedback to ensure the product offers both health benefits and a pleasing sensory experience.

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REGULATORY ROUND UP

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Dear Readers,

Please find below new notifications, orders, etc. since the last round-up

Gazette Notification of amendment in The Food Safety and Standards Rules : This notification gives additional powers to the Adjudicating Officers (AOs). The amendment empowers the AO to levy penalty and punishment under two additional Sections, namely, 61 and 63 under Food Safety and Standards Act (2006). These sections are related to providing false information and carrying out business without a license.

Hon'ble Supreme Court Order dated 07/05/2024 passes in WPC No. 645 of 2022-Indian Medical Association(IMA) &Anr. Vs. Union of India & Ors. aimed at curbing misleading advertisement and protecting consumer interest : As per the Supreme Court order, the advertiser shall submit a self-declaration on the designated portal certifying that the advertisement does not violate the Advertising Code prescribed under Cable Television Rules 1994. This should be done before an ad is printed/ aired/ displayed. All FBOs shall comply with the order.

Testing of prohibited substances declared by World Anti-Doping Agency (WADA) for 'Food for Sportsperson' under FSSAI license : FSS (Nutra) regulations under the category of FSDU have laid down provisions for, "Food for sportsperson". These provisions specify that any prohibited substances declared by WADA shall not be added to such products. FSSAI has also notified, that the "Analytical Testing Laboratory, National Institute of Pharmaceutical Research, Hyderabad" covers testing of prohibited substances declared by WADA. Enforcement authorities may utilise this laboratory for testing of "Food for Sportsperson" with FSSAI license for prohibited substances declared by WADA as and when required.

Mandatory PAN compliance for FSSAI License/Registration : Food authorities have decided to link PAN with FSSAI Licence/ Registration. Therefore, capturing PAN while applying for a new license/ registration or its renewal or modification on the FoSCoS system from 22.10.2024 is mandatory. The existing licensed/registered FBOs should update PAN while renewing. If the FBOs applying for registration do not possess the PAN, they should declarethe non-possession. FBOs are also requested to keep their email ID and mobile numbers updated in FoSCoS.

Revised list of FSSAI notified laboratories for testing of fortificants in Fortified Rice (FR), Fortified Rice Kernel (FRK) and Vitamin-Mineral Premix for Fortified Rice Kernel : An updated list for testing fortificants in FR, FRK, and Vitamin Mineral premix for FRK is given. The laboratories shall accept samples for testing if they have valid accreditation status.

RESEARCH IN HEALTH & NUTRITION

Calcium intake “inadequate” in Asia, says new Lancet study

By Tingmin Koe 17-Sep-2024
NutraIngredients Asia

There is inadequate intake of calcium among Asian countries, says a new study published in The Lancet.

There is 'inadequate' intake of calcium in Asia, especially in South Asia and East Asia, based on a new study published in The Lancet that looks at global nutrient intake estimates. Calcium is one of the nutrients where its estimated intake from food remains “inadequate” for more than half of the global population, with most of the intake inadequacy coming from Asia and sub-Saharan Africa.

Researchers from Harvard T H Chan School of Public Health, University of California, Tel Aviv University, and Mexico’s National Institute of Public Health collaborated on a study to estimate the intake of 15 micronutrients across 185 countries. Using data from the Global Dietary Database, they found that calcium was one of the micronutrients with inadequate intake for over five billion people globally. Regionally, South Asia, East Asia, the Pacific, and sub-Saharan Africa had the highest prevalence of inadequate calcium intake, particularly among individuals aged 10 to 30. In contrast, North America, Europe, and Central Asia had consistently low prevalence of inadequate calcium intake.

In addition to calcium, iodine and vitamin E were also identified as nutrients with inadequate intake for over five billion people globally. Other micronutrients where intake was inadequate for a significant portion of the global population include iron, riboflavin, folate, and vitamin C. Gender differences were also observed, with women showing higher prevalence of inadequate intake for certain nutrients like iodine, vitamin B12, and calcium, while men showed higher prevalence for nutrients like magnesium, zinc, and vitamin A. These findings provide valuable information for public health researchers and practitioners to identify areas for intervention to address micronutrient deficiencies on a global scale.

https://www.nutraingredients-asia.com/Article/2024/09/17/calcium-intake-inadequate-in-asia-new-lancet-study/

Research reveals that fortified food and supplement users had better nutrient intake profile

16 Oct 2024 Nutrition Insight
by Jolanda van Hal

Japanese adults who consumed fortified foods, supplements or both had a higher intake of vitamins and minerals than non-users when nutrient intake was not considered from these “health foods,” according to a new study.

Adults had a higher intake of fiber, vitamins, minerals, fruits, fish and seafood, and dairy products from their base diet. Among fortified foods and supplement users, these products contributed to the adequate intake of thiamine, riboflavin, vitamin B6, vitamin C and calcium. A higher share of this group met the proper intake levels set by dietary reference standards. At the same time, the researchers cautioned that there was a risk of exceeding the tolerable upper intake level (UL) of vitamin B6 among users, as 2% of users exceeded it.

The results of the study conducted by researchers from Toho University provide valuable insights into the nutrient intake levels of Japanese adults aged 20-69. By analyzing the dietary intake of 392 participants, the researchers were able to identify the contribution of fortified foods and dietary supplements to overall nutrient intake. The study revealed that fortified foods and supplements helped improve the intake levels of several important nutrients, including thiamine, riboflavin, vitamin B6, vitamin C, and calcium.

However, the researchers also noted that a significant portion of participants still consumed inadequate levels of essential nutrients like vitamin A, calcium, magnesium, and iron, even when considering fortified food and supplement intake. This highlights the need for further research and strategies to improve overall nutrient intake in the Japanese population.

The authors suggest that these results could serve as a foundation for future research with more nationally representative samples, in order to design effective strategies for addressing micronutrient deficiencies in Japan.

[Research reveals that fortified food and supplement users had better nutrient intake profile]

Vitamin E supplementation combined with high doses of vitamin B6 and niacin shows promise in reducing cataract risk – study

By Hui Ling Dang 16-Sep-2024
NutraIngredients Asia

Targeted supplementation of vitamins E, B6 and niacin could play a key role in maintaining eye health and mitigating the risk of cataract formation, findings from a Chinese study suggest.

Factors such as ageing, smoking, diabetes, and ultraviolet exposure are linked to the development of cataracts. As vitamins are crucial for countering oxidative stress, a fundamental trigger in cataract formation, addressing modifiable risks, particularly through dietary adjustments, could mitigate the onset or severity of cataracts. To elucidate the correlations between consumption of vitamins E, B6, and niacin (B3) and cataract prevalence, a study utilising data from the National Health and Nutrition Examination Survey (NHANES) 2005-2008 was conducted in China.

This Chinese study suggests that higher intake of these vitamins, particularly vitamin E, may play a key role in mitigating the onset or severity of cataracts by countering oxidative stress, a known trigger in cataract formation. The findings of this study provide valuable insights into the potential benefits of targeted vitamin supplementation for maintaining eye health and reducing the risk of cataracts. By identifying the specific vitamins that may be most beneficial in preventing cataract formation, individuals can make informed choices about their dietary habits and potential supplementation strategies.

Further research, including randomised controlled trials, will be essential to validate these findings and determine the optimal dosages for maximum benefit. Ultimately, efforts to incorporate these vitamins into a novel nutritional strategy could have significant implications for preventing cataracts and preserving overall eye health.

The role of vitamins, such as vitamin E and niacin, in preventing and potentially reversing cataract development has been widely studied. Vitamin E, known for its antioxidant properties, has been suggested to protect against the development of age-related cataracts by preserving cell membrane integrity. Meanwhile, niacin is essential for maintaining genetic stability and preventing oxidative stress-induced ocular diseases. However, determining the optimal dosage of these vitamins for cataract prevention remains a challenge. Further research into the potential benefits of different vitamin E variants and the appropriate dosage of niacin is crucial for advancing clinical applications in eye health.

[Vitamin E with high dose vitamin B6 and niacin may lower cataract risk]

Hidden hunger horrors: Indonesia needs more mandatory food fortification to address triple malnutrition threat – expert insights

By Pearly Neo 23-Sep-2024
Food Navigator Asia

Indonesia is grappling with a serious triple malnutrition threat: overnutrition, undernutrition, and micronutrient deficiency, also known as hidden hunger.

To combat this, experts suggest that more mandatory food fortification is needed. Currently, Indonesia mandates the fortification of salt (with iodine), wheat (with iron), and edible oils (with Vitamin A).

However, these programs face significant challenges:
Salt: The goal is to cover at least 90% of households with iodised salt, but the current achievement is still below 80%.

Cooking Oil: While branded palm oil can be fortified easily, ensuring that bulk palm oil is fortified is challenging, especially since over 75% of

poor households use bulk palm oil.

Wheat: There is a lack of academic proof of the effectiveness of wheat fortification, and the program has been unstable, switching between mandatory and non-mandatory over the past two decades.

Despite these challenges, food technology improvements and relatively low costs mean that more mandatory food fortification is on the way. This strategy is crucial for addressing malnutrition on a large scale, as it is the most cost-effective solution available.

The triple malnutrition threat includes overnutrition, undernutrition, and micronutrient deficiency. Addressing micronutrient deficiencies is essential for improving the physical capacity of the public, which in turn would help improve incomes, workforce, and economic development. Some of the biggest micronutrient deficiencies in Indonesia are Vitamin B9 (96.78% of the population), zinc (74.98%), and Vitamin A (59.07%).

Moreover, many Indonesian consumers currently adhere to an energy-sufficient diet that meets caloric needs for short-term subsistence but lacks essential nutrients. The main reason for this is cost, as healthy diets are significantly more expensive than energy-sufficient ones.Addressing these issues through mandatory food fortification could help improve the overall health and economic development of the country.

Indonesia needs more mandatory food fortification to address triple malnutrition threat – expert insights

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Mathematical model demonstrates how breakfast nutrition affects men's and women's health and energy levels.

It's not a bad thing if you pick a toasted bagel for breakfast, while your partner chooses eggs. In fact, according to a new study from the University of Waterloo, that difference could help you lose some weight.

This research has important implications for personalized nutrition and health recommendations, as it highlights the need for tailored dietary advice based on individual factors such as biological sex. Understanding how men and women metabolize different nutrients can help inform dietary choices that optimize energy levels and overall health. By using mathematical models to simulate metabolic responses, researchers can quickly test hypotheses and refine experiments to gain valuable insights into the intricate workings of the human body.

In conclusion, this study sheds light on the unique metabolic differences between men and women, emphasizing the importance of considering biological sex in dietary recommendations. By applying mathematical models to study metabolism, researchers can uncover valuable insights that may not be apparent through traditional experimentation

alone.

As future research continues to explore the complexities of metabolism, personalized nutrition guidelines tailored to individual factors such as sex, weight, age, and hormonal fluctuations have the potential to revolutionize how we approach diet and health.

DOI: 10.1016/j.compbiomed.2024.109024

A University of Queensland-led study has failed to find any strong links between drinking coffee during pregnancy and neurodevelopmental difficulties in children, but researchers are advising expectant mothers to continue following medical guidelines on caffeine consumption.

Dr Gunn-Helen Moen and PhD student Shannon D'Urso from UQ's Institute for Molecular Bioscience (IMB) led an in-depth genetic analysis of data from tens of thousands of families in Norway.

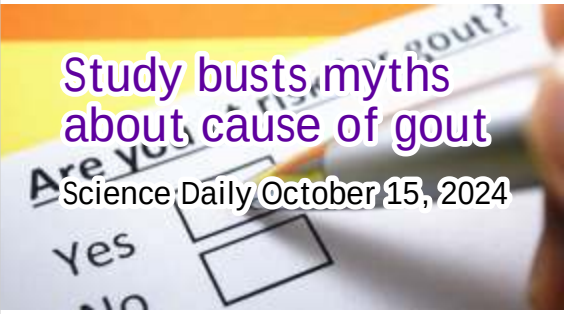
Scandinavians are known for their high coffee consumption, and it is not uncommon for pregnant women in the region

to continue drinking coffee during pregnancy. Dr Moen's study, which used genetic data to analyse the impact of coffee consumption during pregnancy on children's neurodevelopment, found no link between the two. This is important as previous observational studies were unable to separate the effects of caffeine from other environmental factors.

By using a method called Mendelian randomisation, the researchers were able to isolate the impact of caffeine on pregnancy outcomes. This method allowed them to separate out the effects of caffeine, alcohol, cigarettes, and diet, providing a clearer understanding of the impact of caffeine specifically. While the study found no negative effects of coffee consumption during pregnancy on children's neurodevelopment, the researchers still recommend following healthcare provider advice to limit caffeine consumption during pregnancy due to its potential impact on other pregnancy outcomes.

The research team is now looking to further understand genetic and environmental causes of neurodiversity and their impact on brain development during pregnancy. Collaborators on the study included experts from Norway and England, utilizing data from the Norwegian Mother, Father, and Child Cohort Study (MoBa).

DOI:10.1017/S0033291724002216



Study busts myths about cause of gout

Science Daily October 15, 2024

A major international study has found gout is a chronic illness where genetics is a major cause, rather than lifestyle choices of the sufferer.

Led by University of Otago researchers, the genome-wide association study, published in Nature Genetics, analysed the genetic information of 2.6 million people.

The research conducted by Professor Tony Merriman and his team sheds light on the genetic basis of gout, a chronic disease that affects a significant portion of the population. By analysing DNA data sets from around the world, they were able to identify key genetic factors that contribute to why some individuals develop gout while others do not. This important discovery aims to remove the stigma surrounding gout, debunking the myth that lifestyle or diet choices are solely to blame for the condition. By highlighting the role of inherited genetics in the development of gout, individuals with the condition may feel empowered to seek appropriate medical treatment without feelings of shame or guilt.

Furthermore, the identification of immune genes and pathways associated with gout opens up new avenues for treatment options. Professor Merriman is hopeful that improved and more accessible treatments will become available as a result of these findings. Repurposing existing drugs, such as tocilizumab, could offer new possibilities for treating gout and reducing the frequency of painful attacks. With a greater understanding of the genetic factors involved in gout, there is potential for increased health spending and a higher priority placed on the management of this common form of arthritis, particularly in men.

By promoting awareness and education about the genetic basis of gout, individuals affected by the condition can receive the care and support they need to effectively manage this chronic disease.

DOI:10.1038/s41588-024-01921-5

Researchers help redefine core microbiome, opening new chapter in precision health

Science Daily October 17, 2024

A collaborative study introduces a new model for the set of gut microbes found in humans.

Researchers have introduced a novel method for identifying the crucial set of gut microbes commonly found in humans and essential for health. The researchers said the discovery offers innovative opportunities for precision nutrition and personalized therapies aimed at managing chronic diseases associated with gut microbiome imbalances, including diabetes, inflammatory bowel disease and cancer.

The groundbreaking research conducted by Rutgers University-New Brunswick and international collaborators introduces a new method for identifying the core set of gut microbes crucial for human health. The study, which was published in Cell, highlights the importance of the core microbiome in maintaining functions such as digestion, immune defence, and mental health. Dysbiosis, an imbalance between beneficial and harmful microbes in the gut, has been linked to various chronic diseases, making the identification and understanding of the core microbiome essential for developing precision nutrition and personalized therapies.

The researchers identified two distinct groups of core gut bacteria - the Foundation Guild and the Pathobiont Guild - that play opposing roles in gut health. While the Foundation Guild is crucial for stabilizing the gut microbiome by breaking down dietary fibres and producing short-chain fatty acids, the Pathobiont Guild, although necessary in small amounts, can drive disease progression when ecologically dominant. By focusing on nurturing the Foundation Guild to maintain ecological dominance and restore balance in the gut microbiome, personalized nutrition and targeted therapies can be developed to improve patient outcomes for conditions associated with dysbiosis.

Through their innovative Two Competing Guilds model, the researchers aim to revolutionize microbiome research and develop practical treatments to address chronic diseases previously considered irreversible.
DOI: 10.1016/j.cell.2024.09.019

FAO and WHO definition of a healthy diet emphasizes moderation

30 Oct 2024 Nutrition Insight by Milana Nikolova

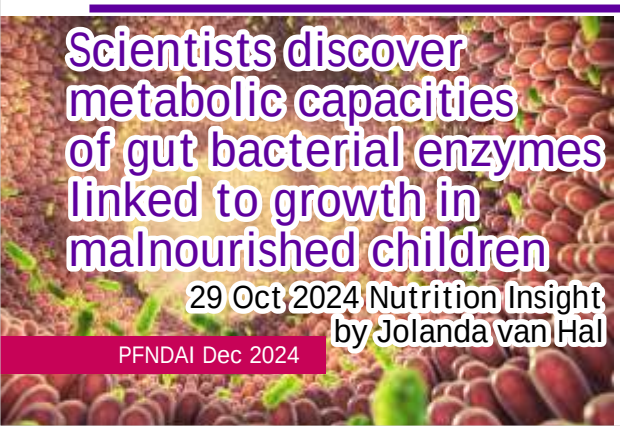
The two UN bodies, FAO and WHO, have released a new document detailing all aspects of a diet plan that promotes human health, growth and an active lifestyle while presenting nutrient deficiencies and excesses.

The report emphasizes the importance of diet in mitigating communicable and noncommunicable diseases, foodborne diseases and overall well-being.

The organizations emphasize the importance of moderation in consuming various foods, nutrients, and other compounds to prevent detrimental effects on health. They stress that a healthy diet should also be diverse, with a wide variety of nutrient-rich foods from different food groups to ensure nutrient adequacy and intake of health-promoting substances. Additionally, the FAO and WHO highlight the significance of ensuring the safety of all food and beverages consumed to prevent foodborne illnesses.

The report also addresses the importance of personalized nutrition based on age, gender, body composition, physical activity levels, physiology, and disease in determining optimal nutrient requirements. For infants aged zero to six months, exclusive breastfeeding is recommended to meet their nutrient needs, while children aged six months and older are advised to consume animal-source foods along with breastfeeding to ensure adequate protein intake.

Furthermore, the document provides dietary recommendations for energy, proteins, fats, vitamins, and minerals, with an emphasis on maintaining nutrient balance and appropriate macronutrient sources, such as plant-based proteins to reduce the risk of cardiometabolic diseases.
The up-to-date FAO and WHO definition of a healthy diet emphasizes moderation



Scientists discover metabolic capacities of gut bacterial enzymes linked to growth in malnourished children

29 Oct 2024 Nutrition Insight by Jolanda van Hal

Researchers have identified a gut bacterial enzyme with metabolic capacities linked to better growth in Bangladeshi children receiving therapeutic food to nurture healthy gut microbes.

The microbiota-targeted therapeutic food (MDCF-2) nourishes the collections of beneficial gut microbes and improves children's growth and other health measures.

The groundbreaking research conducted by the Washington University School of Medicine

team sheds light on the intricate relationship between gut bacteria and human health. By studying the metabolic capabilities of the bacterium strain Faecalibacterium prausnitzii found in children's microbiomes taking MDCF-2, the researchers have uncovered a previously unknown gene responsible for producing and metabolizing key molecules essential for various bodily functions. The discovery of the bacterial enzyme's ability to regulate important lipid signalling molecules like OEA and PEA has significant implications for understanding how gut microbiomes influence human physiology and potential therapeutics for a range of diseases.

The findings of this study not only provide insights into how the gut microbiome impacts human health but also open up new avenues for developing targeted therapies. Understanding the unique capabilities of microbial enzymes like the one identified in F. prausnitzii could lead to the development of novel treatments for malnutrition and other diseases. Furthermore, the team's exploration of the bacterial enzyme's potential to modulate the effects of orally administered drugs highlights the broader impact of gut microbiome research on personalized medicine and healthcare. As the researchers continue to delve into the complex interactions between gut microbes and human physiology, they aim to uncover additional enzymes with unique functions that could revolutionize our understanding of microbial biochemistry and its implications for human health.

Scientists discover metabolic capacities of gut bacterial enzymes linked to growth in malnourished children

Spotlight on consumer-centric solutions from healthy aging to preventative care

24 Oct 2024 Nutrition Insight by Jolanda van Hal

The nutraceutical and functional ingredients market continues to innovate and expand, with data from Innova Market Insights indicating a 5% CAGR growth from July 2019 to June 2024.

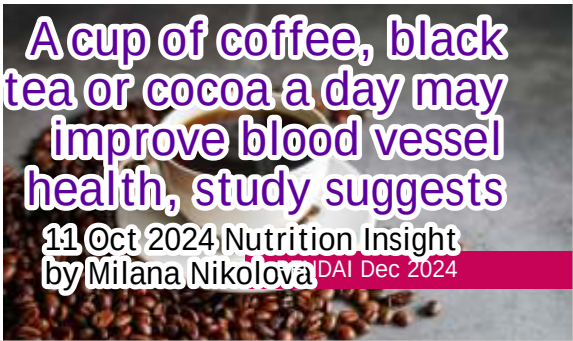
New, consumer-centric solutions and their scientific support are examined in the booming health areas of healthy aging, active nutrition, preventative care and weight management with Lycored, Gencor, Lonza Capsules & Health Ingredients and Ingredients By Nature.

As the focus on healthy aging and personalized nutrition continues to grow, the nutrition industry is adapting to meet the evolving needs of consumers. More and more individuals are seeking nature-based, holistic solutions to support beauty-from-within and overall wellness throughout their aging journey. This shift in consumer preferences has led to an increased demand for functional foods and innovative delivery formats beyond traditional oil forms.

In order to thrive in this competitive market, companies must prioritize scientific validation, innovation, and sustainability while navigating regulatory complexities. By investing in research and development, companies can ensure they are offering clinically validated nutraceuticals that meet the rising consumer demand for preventative care and mental health support.

Additionally, as the industry moves towards more plant-based and sustainable ingredients, companies must adapt their formulations to cater to this growing market while also prioritizing sustainability in their practices. By staying ahead of consumer trends and offering products that meet their evolving needs, companies can position themselves as leaders in the nutrition industry.

Novel nutraceuticals: Spotlight on consumer-centric solutions from healthy aging to preventative care



A cup of coffee, black tea or cocoa a day may improve blood vessel health, study suggests

11 Oct 2024 Nutrition Insight by Milana Nikolova

A new investigation into the effects of caffeine on the cardiovascular system of immunocompromised patients reveals that regular consumption may have a positive effect.

In particular, vascular health — that concerning the functioning of blood vessels — may be boosted by drinking coffee, black tea or cocoa, it says.

The researchers are hopeful that this study will provide valuable insights for patients with inflammatory rheumatic diseases and their doctors. By understanding the potential benefits of caffeine on vascular health, patients may be able to make more informed decisions about their diet and lifestyle choices to better manage their disease.

In the future, the researchers plan to conduct a more extensive study to further investigate the impact of coffee consumption on the progression of inflammatory rheumatic diseases. This longitudinal study will provide more concrete evidence on the role of caffeine in controlling the disease course and potentially reducing the risk of serious cardiovascular events in patients.

Overall, the findings of this study highlight the potential benefits of caffeine in supporting vascular health in patients with inflammatory rheumatic diseases. As further research is conducted, patients and healthcare providers can use this information to develop more comprehensive treatment strategies that focus on not only managing inflammation but also promoting overall cardiovascular health.

A cup of coffee, black tea or cocoa a day may improve blood vessel health, study suggests

Eating more beans and pulses can overcome nutrient shortfalls, study finds

07 Oct 2024 Nutrition Insight by William Nichols

Consuming more bean and legume pulses can improve shortfall nutrient intakes and raise the quality of US diets, according to a recent study.

Researchers measured the increase of beans and pulses within the typical US diet and substantial increases in several nutrients that are a continued focus of public health concerns.

In addition to the nutrient benefits, incorporating beans and pulses into the diet can also have positive public health outcomes. The study's findings suggest that increasing intake of beans can significantly lower the risk of cardiovascular disease, coronary heart disease, stroke, diabetes, and cancer. These are all leading causes of morbidity and mortality in the US, so finding a simple and cost-effective way to reduce these risks is crucial for improving public health.

Furthermore, the study highlights the importance of addressing nutrient deficiencies in the typical American diet. By increasing consumption of beans and pulses, individuals can meet the recommended daily intakes for essential nutrients such as iron, zinc, magnesium, and dietary fibre. This can help prevent deficiencies and support overall health and well-being.

Overall, the research underscores the importance of incorporating beans and pulses into the diet as a natural and effective way to enhance nutrient intake, promote health, and reduce the risk of chronic diseases.

Eating more beans and pulses can overcome nutrient shortfalls, study finds

Multifunctional supplements: Combining ingredients for synergistic health benefits

07 Oct 2024 Nutrition Insight by Jolanda van Hal

As consumers become more educated on nutrition ingredients and their associated health benefits, companies look into the potential of using synergistic ingredients to target multiple health areas with one holistic product to stand out on the market.

Experts from key industry players Clasado Biosciences, Balchem, TriNutra and Gencor discussed how ingredient synergies can add value to a product and improve its efficacy.

Nutrition science is continuously evolving, and the concept of ingredient synergy is demonstrating exciting potential for enhancing the efficacy of health and wellness products. By combining two distinct components, manufacturers can create compelling value propositions for consumers, inspiring innovation and differentiation in a competitive market. Consumers increasingly seek solutions that provide targeted health benefits and cater to their holistic approach to

wellness, driving a significant focus on ingredient synergies in the nutrition industry.

Educated consumers are increasingly aware of the benefits of combining ingredients for better health outcomes. Through rigorous testing, brands can ensure that the synergistic effects of combined ingredients are backed by scientific evidence. From popular combinations targeting joint health, anti-inflammatory properties, and bone and cardiovascular health, to the potential of synbiotics in supporting gut health and overall well-being, ingredient synergy presents a wealth of opportunities for product innovation and improved efficacy.

As consumers demand more from their health and wellness products, the industry is poised to meet their needs with scientifically supported, multi-benefit formulations.
Multifunctional supplements: Combining ingredients for synergistic health benefits

Though many experts agree that a plant-based diet is the most environmentally-friendly and sustainable option, there are several nutrients essential to human health, including certain amino acids, peptides and proteins, that can only be found in animal-based products.

However, a team of China-based researchers, along with the lead author of the study, Lian Jiang, a professor at the Department of Horticulture at Zhejiang University, China, unveil a new procedure to create the nutrients creatine and carnosine inside plants, which may open the door to new and more sustainable synthesis options.

This groundbreaking study showcases the potential of plant-based innovation in the production of animal-based nutrients and workout supplements. By utilizing synthetic biology and introducing DNA sequences into plants, researchers were able to direct the synthesis of various molecules, including proteins, peptides, and amino acids. This method not only allows for the creation of modified plants with beneficial properties, such as reducing bone loss, but also demonstrates the versatility and adaptability of interchangeable synthetic modules in boosting production efficiency.

The successful integration of synthetic modules in Nicotiana benthamiana provides a promising platform for future applications in plant biotechnology. The ability to produce complex nutrients like creatine and carnosine highlights the potential for utilizing plants as sustainable bio-factories for nutrient production. While challenges were encountered in the production of taurine, the overall results of the study lay the foundation for further research and development in using plant-based systems for generating essential nutrients traditionally derived from animals.

This innovative approach not only offers a more sustainable and ethical alternative for producing these compounds but also opens up new possibilities for fortifying edible plants with added health benefits.

Sustainable Nutrition Breakthrough: New synthesis method lets plants produce animal-based nutrients

Global consumers increasingly prioritize holistic nutrition that supports their mental, physical and emotional well-being.

They also favour affordable products that do not compromise taste. F&B ingredient suppliers continue to push the boundaries of functional ingredients, protein diversification and micronutrient profiles to meet these evolving demands. Innova Market Insights data indicates a 16% year-over-year growth in food and beverages with mineral/vitamin fortification between July 2022–June 2023 and July 2023–June 2024. The top categories with mineral/vitamin fortified were Dairy, Soft Drinks and Baby & Toddlers. Vitamin B12, C and A were the top minerals/vitamins used in these launches.

The shift towards viewing food as medicine and prioritizing preventative health has led to an increase in demand for nutritious and functional food products. Consumers today are seeking foods that not only eliminate harmful ingredients but also incorporate beneficial components that support proactive health and wellness. This shift has driven companies like dsm-firmenich to offer nutrient-rich premixes that include vitamins, minerals, nutraceuticals, and functional ingredients that promote overall well-being.

Another key driver in the nutrition market is the growing emphasis on sustainability and the need for sustainable food sources. As the global population continues to rise, there is increasing demand for protein diversification and environmentally sustainable food solutions. dsm-firmenich addresses this demand by offering plant-based proteins that are upcycled and cater to both dietary needs and the demand for sustainable food options. Additionally, innovations in plant-based protein technology are helping to bridge the gap in protein completeness and digestibility between animal-derived and plant-based proteins. With the rise of personalized nutrition and a focus on individual health needs, the nutrition market is expected to continue evolving in the coming years, with a broader range of products catering to specific health preferences and increasing online accessibility for consumers.

Nutrition focus: Ingredient leaders target holistic health as “food as medicine” takes hold

Holistic Nutrition for Women’s Health

By Audrey Yow 04-Sep-2024
NutraIngredients Asia

There are extensive opportunities for holistic product innovation across three key areas of women’s health: menstrual health, prenatal nutrition, and menopause.

Menstrual Health: Managing menstrual health is crucial for women's long-term health and longevity. Relief for common symptoms such as cramps and mood swings support overall well-being during menstrual cycles. Future products could focus on addressing menstrual health as a foundation for women's longevity. Vitamins, minerals, and supplements (VMS) can help with women's menstrual health issues, laying the groundwork for pro-longevity.

Prenatal Nutrition:
Personalized nutrition in pregnancy is vital due to diverse health conditions, preferences, and nutrient needs. Brands can fill the nutritional gap in pregnancy by offering nutrient-rich food, drink, and supplements, supporting maternal and child health more effectively than mere consumer education. Incorporating gut-friendly ingredients like probiotics and prebiotics into prenatal nutrition solutions is a great way to support prenatal nutrition needs via gut health.

Menopause: By 2025, one billion women – 12% of the worldwide female population – will be experiencing menopause. Menopause goes beyond hot flashes and needs a holistic health approach as hormonal imbalances affect multiple body systems. Brands can offer products that positively affect various physical and mental health aspects. Some products that can alleviate discomfort include herbal teas or infusions, calcium and vitamin-D-fortified products, and ingredients that promote sleep.
Women need a holistic approach to their specific health and nutritional requirements to empower them throughout womanhood. Companies should be mindful, nutrient-focused, and solution-driven to improve women's lives at every stage.
Menstrual health, prenatal nutrition, and menopause are opportunities for product innovation

B. adolescentis positively linked with blood glucose level, say scientists

Tingmin Koe, August 19, 2024,
NutraIngredients Asia

The article discusses a study from Singapore that found a link between gut microbiome composition and blood glucose levels, total cholesterol levels, and other chronic diseases.

The study was conducted by researchers from the Genome Institute of Singapore, Singapore Immunology Network, National University of Singapore, and Vrije Universiteit Amsterdam.

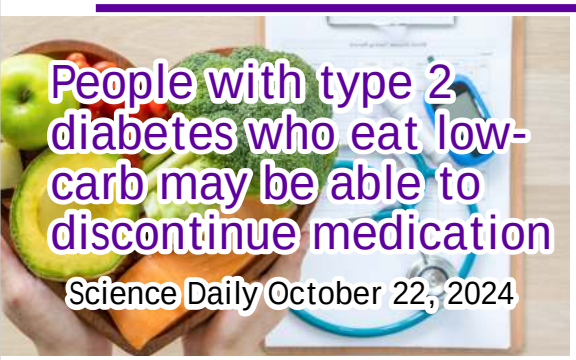
It analysed the gut microbiome of 234 Singaporean elderly between the ages of 71 and 100 using deep shotgun metagenomic analysis.

Bifidobacterium adolescentis and Parabacteroides goldsteinii were found to be positively linked to fasting blood glucose levels. Lactobacillus mucosae was also positively linked with fasting blood glucose, a finding not previously described. Lachnospiraceae bacterium 14 56FAA was positively associated with total cholesterol levels, while Haemophilus parainfluenzae was negatively associated with total cholesterol levels. An opposite trend was observed for low-density lipoprotein (LDL) cholesterol, with higher levels of Haemophilus parainfluenzae linked to higher LDL cholesterol levels. Klebsiella pneumoniae was associated with high serum levels of the enzyme aspartate aminotransferase (AST), indicating liver damage.

Microbiome Shifts in the Elderly: The study found a shift in gut microbiome composition among the elderly, with a reduction in microbial richness and a depletion in butyrate-producing bacteria species. This depletion was replaced by an increase in specific Alistipes species that can produce butyrate through an alternate pathway using amino acids as precursors.

These findings highlight the potential beneficial roles of certain gut microbiome species in maintaining health and the value of species-level shotgun metagenomic analysis in understanding microbiome shifts with age.

B. adolescentis is positively linked with fasting blood glucose level



People with type 2 diabetes who eat low-carb may be able to discontinue medication

Science Daily October 22, 2024

Study finds low-carbohydrate diet may improve beta-cell function in people with type 2 diabetes.

Adults with type 2 diabetes on a low-carbohydrate diet may see benefits to their beta-cell function allowing them to better manage their disease and possibly discontinue medication, according to new research published in the Endocrine Society's Journal of Clinical Endocrinology & Metabolism.

Beta-cells are essential in maintaining proper blood sugar levels, and their dysfunction can lead to serious health complications. With the prevalence of type 2 diabetes on the rise, finding effective methods to support beta-cell function is crucial. Research like the study conducted by Barbara Gower and her team sheds light on the potential benefits of a low-carbohydrate diet for individuals with type 2 diabetes.

The findings of this study suggest that reducing carbohydrate intake may help improve beta-cell response and insulin secretion, ultimately leading to better management of type 2 diabetes. This could have significant implications for individuals struggling with the condition, potentially allowing them to reduce or even discontinue medication while still enjoying a satisfying and balanced diet.

Further research is needed to explore the full extent of these benefits and to determine if a low-carbohydrate diet could lead to remission in cases of type 2 diabetes. Overall, these findings provide hope for better outcomes for individuals with type 2 diabetes and offer a promising path towards improved management of the disease.

DOI: 10.1210/clinem/dgae670

& FOOD SCIENCE INDUSTRY NEWS

Industry leaders reveal the future of sustainable, performance nutrition

10 Oct 2024 Nutrition Insight
by William Nichols

Protein remains essential in active, sports and specialized nutrition and is now attracting a wider audience of consumers who are interested in maintaining their overall health.

The performance protein space is evolving with innovative formats, novel and off-note masking flavours, diversified sourcing — including plant-based options — and targeted health benefits driving market expansion.

Experts from Arla Foods Ingredients, FrieslandCampina Ingredients, and Synergy Flavours all agree that the demand for innovative and high-quality protein products is on the rise.

Consumers are not only looking for products with high protein content but also for those that offer superior nutritional value, naturality, and great taste.

The focus is shifting towards complete protein sources that cater to different nutritional goals and preferences, whether it be for performance, muscle recovery, or overall health.

The experts emphasize the importance of developing products that not only meet the functional needs of active consumers but also deliver on taste and texture.

With advancements in flavour pairing and masking techniques, developers can create delicious and appealing protein products that meet consumer expectations.

Additionally, catering to the latest trends such as clear protein powders and plant-based options is crucial in staying competitive in the market and meeting the diverse needs of consumers.

Overall, the future of the protein market looks promising, with a continued focus on high-quality ingredients, innovative formulations, and products that not only deliver on performance but also on taste and overall experience.

Protein powerhouses: Industry leaders reveal the future of sustainable, performance nutrition

Industry experts explore emerging ingredients in Mmental health supplement space

08 Oct 2024 Nutrition Insight
by Milana Nikolova

The nutrition for mental health category is here to stay as consumers continue to seek out ingredients that boost mood and support mental wellness.

We continue our conversation with industry experts from Novonesis, Gnosis by Lesaffre and EnovateBiolife, about what is next for this growing dietary supplement space.

As mental health continues to take centre stage in the wellness industry, consumers are increasingly prioritizing supplements and ingredients that support brain health.

Brands are responding to this growing demand by offering a variety of solutions, with a focus on scientifically backed and clinically supported ingredients.

The emergence of psychobiotics, which target the gut-brain axis, has garnered significant consumer interest due to their unique ability to promote mental wellness in a natural and sustainable way.

Innovations in the mental health space are also evident in products like SAMe, which has shown promise in managing depression symptoms.

Research on SAMe's efficacy in alleviating depressive symptoms and its potential to regulate neurotransmitter synthesis has positioned it as a valuable ingredient for mental health support.

Companies like Gnosis are prioritizing the quality and safety of their SAMe products, ensuring that consumers have access to a reliable and effective solution for maintaining a healthy mood.

Overall, the mental health and wellness market is poised for further growth and innovation as consumers become more aware of the connection between mental and physical well-being.

Industry experts explore emerging ingredients in mental health supplement space

NTU Singapore scientists have created a biodegradable food wrap that changes colour when the food it protects has spoiled. The wrap also has antibacterial properties that could protect the food from microbial contamination.

The innovative food wrap created by researchers at NTU offers a sustainable solution to food packaging while also effectively addressing food safety concerns. By utilizing discarded avocado pits and seeds from durian and jackfruit, the wrap not only helps minimize waste but also harnesses the natural antimicrobial properties of these ingredients to prolong the freshness of food.

The colour-changing properties of the wrap provide a visual indicator of food spoilage, allowing consumers to easily identify when their food may no longer be safe to eat.

Industry partners have recognized the potential of this upcycled food wrap in revolutionizing the way food is packaged and preserved.

With a growing focus on sustainability and reduction of waste in the food industry, this innovative product could play a crucial role in creating a more secure and environmentally-friendly food system.

The research conducted by NTU not only showcases the power of nature in combating food spoilage but also demonstrates how overlooked elements of the food production cycle can be optimized to achieve a greener impact with less waste.

Singapore scientists develop antibacterial food packs from upcycled fruit waste that change color during spoilage

Biosolutions platform with launch of seafood disease solution

25 Oct 2024 Food Ingredients First
by Elizabeth Green

Umami Bioworks, a key player in cellular agriculture and sustainable biosolutions, has launched Arbiter, a new seafood safety and quality assurance solution aimed at addressing the growing challenges of pathogen detection and quality assessment across the seafood value chain.

Leveraging their core marine biology expertise, it has launched Arbiter, a groundbreaking diagnostic platform that offers unprecedented precision, speed, and cost-effectiveness in pathogen detection.

By detecting up to 800 unique targets in a single run and providing actionable results in under six hours,

Arbiter revolutionizes pathogen diagnostics and quality control. With minimal preparation time and a cost of less than US$1 per target, this platform democratizes access to high-quality pathogen detection, making it more accessible and scalable than ever before.

This expansion into the biotech industry marks a strategic move showcasing their ability to apply their platform knowledge to a wide range of critical challenges in industries such as aquaculture, food safety, and environmental monitoring.

Arbiter is poised to revolutionize disease detection in aquaculture species, ensure the safety and quality of global food supplies, and protect ecosystems by identifying harmful pathogens in aquatic environments.

Umami Bioworks extends biosolutions platform with launch of seafood disease solution

"Colour to communicate" gains ground as tighter regulation drives F&B innovation

23 Oct 2024 Food Ingredients First
by Gaynor Selby

The move toward natural colours is gathering pace as consumer pressure for naturalness ramps up and governments introduce legislation prohibiting artificial colours or limiting the scope of synthetics.

Colour innovators turn toward natural ingredients to provide the striking and vibrant colours consumers are looking for without compromising on vivacity, functionality and stability.

Kelly Newsome, senior global marketing manager at Colors& Savory Flavors at ADM, believes that the fast pace of technological advancements is influencing consumer preferences for colours and sensory experiences. She emphasizes the importance of connecting with consumer emotions and experiences through the use of colours in food and beverage products. Newsome predicts that consumers will continue to seek simplicity, authenticity, and wellness in their food choices in the coming years.

Meanwhile, Catalina Ospina, technical marketing specialist at Givaudan Sense Colour, highlights the significance of colours in conveying sensory and emotional cues to consumers. She notes that colours are essential in aligning with trendy flavours and ingredients, as well as communicating abstract concepts like feelings and aspirations.

Ospina points out emerging trends that reflect consumers' desire to connect with nature, experience nostalgia, and indulge in adventurous food experiences. She mentions the importance of using colours to create visual appeal and establish product identity, especially in the context of growing consumer interest in sustainability.

"Color to communicate" gains ground as tighter regulation drives F&B innovation

HFSS-compliant high-protein desserts and yogurts

09 Sep 2024 Food Ingredients First

Müller Milk & Ingredients has collaborated with sports nutrition player Myprotein to launch a new line of high-protein yogurts and desserts, meeting the growing demands of health-conscious consumers for convenient protein formats.

The partnership aims to harness the potential of the chilled yogurt and potted dessert (CYPD) segment and overcome shopper barriers related to protein solutions. The company says the new products are high in fat, salt or sugar-compliant (HFSS) and have been crafted for an active lifestyle.

The new range of high-protein yogurts and low-fat puddings from Müller Yogurt & Desserts is set to shake up the dairy aisle with its focus on making protein-packed desserts accessible to all consumers. With no added sugar and a variety of flavours like chocolate, vanilla, and salted caramel, these products aim to address consumer concerns around taste and credibility in the sports nutrition space. By partnering with Myprotein, the brand is catering to the growing number of everyday active consumers who are looking to make healthier choices without compromising on taste. This collaboration taps into the health and nutrition megatrend, offering consumers guilt-free indulgence options that are both delicious and nutritious.

With a focus on driving protein category growth and transforming the health category, Müller Yogurt & Desserts is poised to meet the demands of health-conscious shoppers worldwide. Look out for these innovative products on shelves starting September 11, supported by exciting in-store and digital campaigns.

https://www.foodingredientsfirst.com/news/muller-and-myprotein-launch-hfss-compliant-high-protein-desserts-and-yogurts.html

Price parity and climate concerns challenge adoption of plant-based meat in UK, flags The Food Foundation

04 Sep 2024 Food Ingredients First
By Anvisha Manral

The push for more sustainable and healthy food choices continues to grow, with plant-based meat alternatives at the forefront of this trend.

However, challenges such as price parity between plant-based and conventional meat hinder the widespread adoption of these alternatives. The UK, in particular, lags behind other European countries in making plant-based meat alternatives more affordable for consumers.

With the impact of climate change and the need for more environmentally friendly food options becoming increasingly urgent, there is a call for F&B companies to make plant-based alternatives more accessible and appealing to everyone. Government policies supporting the production and consumption of UK-grown fruits, vegetables, and legumes, as well as measures to make plant-based alternatives more affordable and available in public spaces, are crucial steps in addressing these challenges and promoting more sustainable food choices.

Despite the nutritional benefits of plant-based meat alternatives, such as lower levels of saturated fat, calories, and salt, there are concerns about meeting certain micronutrient requirements, such as iron and Vitamin B12. Tobi suggests that a plant-forward diet can still provide these essential nutrients through fortified foods, beans, nuts, seeds, and leafy green vegetables.

By addressing barriers to consuming more beans, such as lack of familiarity and preparation knowledge, and providing convenient and tasty options, the UK can work towards a more sustainable and health-conscious food landscape.

https://www.foodingredientsfirst.com/news/price-parity-and-climate-concerns-challenge-adoption-of-plant-based-meat-in-uk-flags-the-food-foundation.html

Malt extract is the secret ingredient elevating flavour, texture in foods

Kimberly Decker, October 9, 2024
Supply Side Food & Beverage Journal

Malt extract, a versatile ingredient originally used in brewing, offers numerous benefits in baking, confectionery and breakfast cereals, providing sweetness, flavour and functional properties.

Casual homebrewers and beer enthusiasts are familiar with the process of malting barley grains to create malt extract, a versatile ingredient with various culinary applications.

Briess Malt & Ingredients Co. considers malt extract to be the original grain-based sweetener, offering rich flavour, colour, and texture enhancements in a wide range of recipes.

In baking, malt extract aids in dough rise, moisture retention, and crust development, while also contributing to the unique flavours of baked goods like bagels and cookies.

Malt extract is a common ingredient in breakfast cereals, providing a malty sweetness and golden hue, along with textural benefits that prolong cereal crispness in milk.

While malt extract was once marketed as a health-conscious ingredient, it is primarily a source of simple sugars and is more beneficial for enhancing flavour and texture in foods than for nutrition.

Pastry chefs appreciate malted milk powder for adding complexity and umami notes to desserts, while confectioners use it to enhance the sweetness, flavour, and texture of various sweets and dairy products. Overall, malt extract is prized for its ability to elevate the taste and quality of a wide range of culinary creations.

https://www.supplysidefbj.com/food-ingredients/malt-extract-is-the-secret-ingredient-elevating-flavor-texture-in-foods

Researchers boost sustainable cultured meat production with new system for animal serum alternative

29 Oct 2024
Food Ingredients First
by Gaynor Selby

The burgeoning cultivated meat industry is progressing toward commercialized products as food innovators worldwide gain regulatory approval for cell-based products.

However, one of the main sticking points holding back progress is the cost of serum, a crucial component of cultivated meat. Now, researchers in Tokyo, Japan, are making waves by using photosynthetic microorganisms to create a self-purifying, nutrient-circulating system for eco-friendly cultured meat production.The team has developed a system where growth factor-secreting liver cells and photosynthetic microorganisms can be grown together.They claim this creates an environmentally friendly medium for growing muscle cells without using animal serum (the liquid part of the blood from animals) while also lowering costs.

The development of serum-free cell culture methods represents a significant step forward in the field of cellular agriculture and regenerative medicine. Not only does this innovation address the high costs and contamination risks associated with traditional serum-based approaches, but it also tackles the ethical concerns surrounding the use of animal-derived products in scientific research and food production. By harnessing the power of photosynthetic microorganisms to recycle waste metabolites and provide essential nutrients for cell growth, researchers are paving the way for a more sustainable and cruelty-free future.

As companies like Eat Just and Upside Foods begin to transition towards serum-free media in the production of cultivated meat, it becomes clear that the era of animal serum in cellular agriculture is quickly coming to an end.

With the support of organizations like the Good Food Institute, which advocates for the development and adoption of animal-free cell culture technologies, the industry is poised to embrace new and innovative methods that promote both economic efficiency and ethical integrity. By adopting these cutting-edge techniques, researchers and food producers are not only revolutionizing the way we grow and cultivate cells, but also taking a crucial step towards a more sustainable and humane future for food production.

Researchers boost sustainable cultured meat production with new system for animal serum alternative

While alternative meat and dairy products initially started with a sharpened focus on mimicry of conventional meat and dairy products, the trend is now shifting.

Consumers are keen to reduce animal-based product consumption and eat more plant proteins, highlighting the “superior nutrition” with higher protein, fewer saturated fats and environmental impact.But at the centre of any NPD, taste is still key. Advancements in cell culture and precision fermentation, clean label demands as well as blending protein sources continue to propel innovation in the field.

Overall, the alternative meat and dairy landscape has come a long way in the past decade, with a focus shifting from mimicry of conventional products to innovation in ingredients, textures, and flavours. Companies like Planteneers, ADM, Sensient Flavors & Extracts Europe, and IFF are at the forefront of this evolution, utilizing a range of plant proteins, fermentation techniques, and flavour masking technologies to create cleaner label formulations that prioritize taste, texture, and sustainability.

As consumer preferences continue to shift towards plant-based diets, the industry is constantly evolving to meet these demands through blended protein solutions, cell-cultured ingredients, and precision fermentation technologies. Regulatory frameworks are also playing a key role in shaping the plant-based alternative landscape, with stricter guidelines on labelling and marketing strategies.

Despite these challenges, companies are optimistic about the future, with a focus on sustainability, clean label formulations, and the development of innovative products that can cater to the growing market of plant-based consumers.
https://www.foodingredientsfirst.com/news/packamama-equips-the-wine-society-with-oxygen-scavenging-flat-rpet-bottles.html

With consumers taking a strong interest in formulations and what goes into their food, the demand for healthier and natural products is rising.

F&B manufacturers tapped into clean eating trends with innovative product presentations at SIAL 2024, which took place in Paris, France. Offerings like plant-based beverages, fruit purees and dried fruit snacks highlighted these trends with clean labels, natural ingredients and reduced sugar.

The trend towards clean label and natural formulations is gaining momentum as consumers become more conscious of what they are putting into their bodies.

Companies like Fermentful, Açaí Motion, Essento, and Selcuk are responding to this demand by offering products that are made with natural, wholesome ingredients and contain minimal additives or preservatives. By focusing on ingredients like plant-based proteins, insect protein, açaí, guaraná, and fruit juices, these brands are able to deliver products that not only taste good but also provide health benefits.

Reducing sugar content is also a key focus for these brands, as

they aim to offer healthier alternatives to traditional snacks and beverages. By utilizing alternative sweeteners like allulose and emphasizing the natural sweetness of fruits, companies like Ocean Spray Ingredients, Fermentful, Selcuk, and Fructus Meran are able to provide products that are lower in sugar but still flavourful and satisfying. This approach not only appeals to health-conscious consumers but also aligns with the wider trend towards clean eating and natural ingredients.
Overall, the shift towards clean label and natural formulations reflects a growing awareness of the importance of transparency and sustainability in the food and beverage industry.

Natural ingredients, sugar reduction and plant-based offerings take center stage at SIAL 2024

Plant-based food sales are gaining momentum in the EU, with plant-based milk and meat now considered “mainstream options” in the UK, Spain and Germany.

An analysis by the Good Food Institute (GFI) Europe reveals the category sales surged by 5.5% to €5.4 billion (US$5.8 billion) last year, as consumers continue to exhibit an increasing appetite for alt-protein foods.The nonprofit and think tank analysed six European countries between 2022 and 2023 and found that Germany — Europe’s largest market for plant-based foods — continued to show growth across most product categories, while the overall sales volume grew in Spain and France and remained stable in Italy.

The rise of plant-based products in the European market is evident, with more consumers showing interest and purchasing these alternatives. The plant-based sector is not only gaining popularity among vegetarians and vegans but has expanded to a broader consumer audience. The success of plant-based milk and meat categories in European countries like Germany, the UK, and Spain reflects the growing trend towards plant-based products. The increasing availability of plant-based options, along with improvements in quality and reduced price-gaps compared to conventional products, are driving the growth of this market.

Consumer demand for plant-based foods is not only driven by concerns for the environment but also by a desire for variety and choice in their diets. Younger adults, in particular, are embracing plant-based options, ensuring the longevity of this trend. Manufacturers and retailers are focusing on improving and expanding plant-based offerings to meet the evolving preferences of consumers. While there are challenges such as price parity and competition with conventional products, the plant-based industry is continuously innovating to provide consumers with more sustainable and diverse food options. As the market continues to grow, the future of plant-based foods looks promising, catering to a wide range of dietary preferences and lifestyle choices.

Shrinking price gaps and wider consumer acceptance propels EU plant-based food sales

German ingredient specialist Loryma has introduced a wheat-based product that gives breaded foods a crunchy texture without adding fat or deep-frying.

Though recently advertised as a caffeine-free, healthy coffee alternative, the drink is a fancified version of haldidoodh — a traditional Indian beverage often used as an at-home cold remedy. And now, researchers have developed an efficient method to make a plant-based, instant version that maintains the beneficial properties of the ingredients while also extending its shelf life.

Golden milk, with its vibrant yellow hue and unique flavour profile, has gained popularity as a caffeine-free alternative to coffee or tea. It is not only a delicious beverage to enjoy on a cold day or when feeling under the weather,

but it also provides potential health benefits thanks to the curcumin found in turmeric. The antioxidant and anti-inflammatory properties of curcumin make golden milk a nutritious choice for those looking to incorporate bioactive compounds into their diet.

The innovative research conducted by Suryamiharja, Zhou, and their team explores a way to extract and preserve curcumin in plant-based milk, specifically soy milk. By using an alkaline solution to enhance the solubility of curcumin and encapsulating it in oil droplets within the milk, they have created an instant golden milk powder that is shelf-stable and more bioavailable in the body.

This method not only improves the efficiency of curcumin extraction but also opens the door to potential applications in other plant-based foods, reducing food waste and increasing nutritional value. This groundbreaking work showcases the intersection of chemistry, nutrition, and innovation in the realm of functional beverages like golden milk.

Researchers develop an instant version of trendy, golden turmeric milk - American Chemical Society

MSU Develops Healthier Potato for Chips, Grocery Tech on the Rise, Specialty Morning Joe

By Emily Little August 5, 2024
Food Technology Magazine

A team of researchers at Michigan State University (MSU) has developed a genetically engineered potato that can produce healthier, higher-quality potato chips.

The Kal91.3 potato, bred from the Kalkaska variety, can be stored in cool temperatures for long periods of time without sucrose converting to glucose and fructose. This minimizes the potato's reducing sugars, which can cause off-colour browning and caramelization. The Kal91.3 potato is exempt from regulation by the U.S. Department of Agriculture's Animal and Plant Health Inspection Service (USDA APHIS), meaning the department determined that the genetically engineered potato does not pose an increased plant pest risk.

The research conducted at MSU regarding the gene that produces vacuolar acid invertase in potatoes is groundbreaking in the field of biotechnology and crop improvement. By modifying this gene in the Kal91.3 potato, researchers were able to create a potato that can be stored at lower temperatures while maintaining its sugar balance and improving overall quality. This potato not only provides a healthier and crispier chip but also has potential to reduce environmental impact by requiring less fertilizers and pesticides. The innovative use of biotechnology in crop breeding is paving the way for more sustainable and resilient agriculture practices in the face of climate change.

On the consumer side, the rise of specialty coffee beverages among young Americans showcases changing trends in the coffee industry. The increasing consumption of specialty coffee, particularly forms like espresso and cold brew, indicates a shift towards more trendy and artisanal coffee options. This trend is also seen in the preference for at-home preparation of coffee beverages with single-cup brewing machines, as well as the growing popularity of convenience options like ready-to-drink coffees. Understanding consumer preferences and behaviours in the coffee industry is crucial for businesses to adapt and innovate in order to cater to the evolving tastes of the market.

ZBiotics Launches Sugar-to-Fiber Probiotic Drink Mix

September 17, 2024
SAN FRANCISCO BUSINESS WIRE

ZBiotics–the biotechnology company developing purpose-built genetically engineered probiotics to improve daily life–today announced the launch of Sugar-to-Fiber Probiotic Drink Mix, the first product of its kind for the consumer market.

Developed by its team of PhD microbiologists, Sugar-to-Fiber is a genetically engineered probiotic specifically designed to address deficiencies

in the American diet by converting dietary sugar (sucrose) into a special type of prebiotic fibre (levan) continuously throughout the day.

By introducing Sugar-to-Fiber into the market, ZBiotics is revolutionizing the way we approach gut health by providing a comprehensive solution that goes beyond simply increasing fibre intake. This innovative product not only addresses the fibre deficiency prevalent in Western diets but also considers the importance of fibre diversity and timed-release mechanisms for optimal gut health.

ZBiotics Launches Sugar-to-Fiber Probiotic Drink Mix | Business Wire

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The rising demand for global flavours is significantly influencing innovation and ingredient sourcing in the food and beverage industry.

US consumers are increasingly seeking bold and adventurous flavours that transport them to different countries and cultures. This trend is driving the development of new frozen meals, sauces, spice blends, and beverages that offer a taste of global cuisine.

Key trends include:
Floral, Herbaceous, and Root Flavors: There is a growing interest in flavours like lavender, rose, basil, rosemary, dill, thyme, ginger, and yuzu, which are associated with health benefits and nature.

Frozen Meals: These are becoming a gateway to global flavours, balancing affordability, nutrition, and convenience.

Sauces and Condiments: These products are allowing consumers to experiment with global flavours at home, contributing to the fast growth of the seasoning category.
Ready-to-Drink Beverages: Consumers are seeking a wide range of sweet and spicy flavours, including globally inspired tastes like Tajin, horchata, and honeydew.

Macro-trends such as the clean-label movement, ongoing inflation, and rising interest in environmental and social welfare are also influencing flavour innovation and supply chain management. The demand for natural flavours is increasing, but it must be balanced with price considerations1. Additionally, consumers are becoming more interested in the origins of their spices and the impact on smallholder farmers.

Letter from the editor: How is rising demand for global flavors influencing innovation & ingredient sourcing?

Frozen foods increasingly serve as a vehicle for global flavours, driven by consumer demand for international cuisine while balancing affordability, nutrition and convenience.

This evolution from the early days of TV dinners in the 1950s reflects a significant shift in the frozen food industry. Today, nutrition and taste are core elements in delivering authentic global flavours, meeting the growing consumer demand for both convenience and culinary exploration.

“The frozen food category is dynamic … in responding to consumer needs and introducing new flavours, new taste profiles that perhaps we were not seeing in the frozen food aisle a number of years ago … and it was a category that saw a huge disruption and shift in growth during the COVID-19 pandemic,” Mary Emma Young, VP communications at the American Frozen Foods Institute (AFFI), told FoodNavigator-USA. Overall, frozen food sales for the year totalled $84.4 billion, with $6.8 billion generated in July alone, according to AFFI’s retail market insights report.

Frozen foods are increasingly serving as a gateway to global flavours, driven by consumer demand for international cuisine while balancing affordability, nutrition, and convenience. This shift reflects a significant evolution from the early days of TV dinners in the 1950s.

Today, nutrition and taste are core elements in delivering authentic global flavours, meeting the growing consumer demand for both convenience and culinary exploration.

Millennials and Gen X are driving growth in frozen meals, making up 38% of core consumers in the category1. As dining out becomes more expensive, retail-based food purchases have increased, reflecting more cooking at home.

Looking forward, frozen meals will offer more experimentation with global flavours and fusion cuisine, providing a wide range of authentic global cuisines. Brands like House of Kajaana are focusing on offering premium and nutritious ingredients, making authentic Indian flavours accessible to more people1.

The use of technology, such as flash freezing, ensures that the meals maintain their flavours, texture, and nutrients without preservatives or additives.

Consumers are increasingly seeking bold, globally-inspired flavours, leading to innovation in frozen meals, sauces, spice blends, and beverages.

This trend is driven by a desire for authentic, international tastes and is influenced by macro-trends such as the clean-label movement, inflation, and interest in environmental and social welfare. Floral, herbaceous, and root flavours are gaining popularity, as seen at the Summer Fancy Food Show in New York City. These flavours are associated with health benefits and nature, including lavender, rose, basil, rosemary, dill, thyme, ginger, and citrus varieties like yuzu.

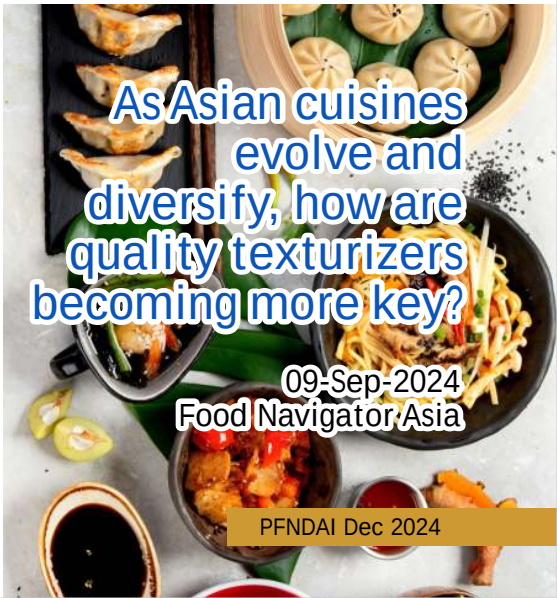
Frozen meals are becoming a gateway to global flavours, offering convenience, nutrition, and affordability. Sauces, condiments, and spices are also providing consumers with easy ways to experiment with international tastes at home. The ready-to-drink beverage category is embracing sweet and spicy flavours, such as Tajin, horchata, and Asian fruit flavours like honeydew
.
The clean-label trend is boosting demand for natural flavours, but price remains a key factor. Companies like T. Hasegawa are meeting this demand with USDA-certified meat and poultry flavours. Inflation is driving consumers to cook at home more, increasing demand for spices and blends that simplify cooking and reinvent leftovers.
Spice companies like Burlap & Barrel are reimagining the spice trade to create better value for smallholder farmers and deliver more flavourful experiences to consumers. This shift is driven by consumers' desire to know more about the origins, safety, and environmental impact of their spices.

https://www.foodnavigator-usa.com/Article/2024/09/12/letter-from-the-editor-how-is-rising-demand-for-global-flavors-influencing-innovation-ingredient-sourcing/

As Asian cuisines evolve and diversify, quality texturizers are becoming increasingly important in delivering the desired sensory experiences that consumers expect.

Traditional dishes are being reimagined and fused with global flavours, creating a dynamic culinary landscape. Sauces play a crucial role in Asian cuisine, and the variety of sauces is extensive, spanning savoury and sweet applications from ready meals and marinades to bakery fillings and dairy-based desserts.

Texturizing ingredients, such as starches and gums, are essential for achieving and maintaining consistency of texture and stability in sauce and filling formulations. They enhance the overall flavour profile, mask undesirable off-flavours, and provide the target consistency and texture.



Tapioca-based starches, in particular, are gaining popularity due to their ability to meet diverse industry demands and enhance the viscosity and consistency of applications that require thickening.

The texturizer industry has expanded its cook-up starches with four new tapioca-based grades. These modified starches address the market's unmet texture needs, such as clarity, neutrality in taste, and mouth-coating qualities. Tapioca starch is naturally gluten-free and does not introduce distinct flavours, allowing the natural taste of food to shine through.

The CLEARAM TR range is designed to enhance viscosity, consistency, and elasticity across a wide range of food applications, from sauces to dessert fillings. These starches maintain a natural colour and taste profile, making them ideal for applications that require a transparent, neutral appearance and flavour.
As consumers continually seek new and exciting sensory experiences, quality texturizers like those from Roquette can help food manufacturers create products that offer unmatched texture and maximum consumer appeal. This supports the ever-evolving culinary journey of consumers who are eager to explore new flavours and textures in their food.

Roquette's Clearam texturizers for sauces, desserts, fillings and bakery fillings

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A Japan-based company, is aiming to revolutionize the cola category with its new botanical-rich, koji-sweetened beverage and an innovative can design.

Craft cola is immensely popular in Japan, with over 1,000 varieties featuring specialty ingredients, fruits, spices, and medicinal herbs. To stand out in this competitive market, Umami Cola has introduced several unique features. Umami Cola's can design is inverted, with the tab located at the bottom instead of the top. This radical design change is intended to change consumers' perspectives on what cola can be.

Additionally, the ingredients list is prominently displayed on the front of the can in large font, showcasing transparency and confidence in the product's ingredients.Unlike traditional soft drinks, Umami Cola specifically requests consumers to shake the can before consumption. This is because the beverage contains real herbs and spices that tend to form sediment at the bottom of the can, highlighting the use of real ingredients.

Umami Cola positions itself as a healthier beverage and a natural energy drink, using koji as a natural sweetener. Koji, made from fermented rice, is high in nutrients and naturally sweet, replacing cane sugar. It is known to have over 350 beneficial components and is good for gut health and overall well-being.

Japan's Umami Cola looks to upend cola category with botanical-rich, koji-sweetened beverage

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Intentionally designed to avoid the need for dramatic dietary changes, a new study has revealed the heart-health benefits of an ingredient found in the pantry of most households.

The consumption of whole grains has long been known to slash the risk of chronic diseases such as cardiovascular disease, diabetes and cancer – thanks to their dietary fibre content and associated bioactive compounds, such as polyphenols.

To date though, the majority of research has explored wheat-based foods, which many consumers perceive as less palatable (texture is denser, chewier or gritter and taste can be bland or earthier) than their low-fibre counterparts; one of the reasons for the fibre gap. The fibre gap refers to the discrepancy between the recommended intake of dietary fibre and the actual consumption by individuals in many populations, particularly in developed countries.

The high fibre content in corn, which includes insoluble fibre and health-promoting bioactives like arabinoxylan and ferulic acid, can help improve heart health and metabolic regulation.

Participants in the study were provided with corn muffins and pita bread made from different types of corn flours, with a blend of refined corn meal and corn bran showing the most positive results in reducing LDL cholesterol concentrations. Surprisingly, there were minimal changes to gut microbiota diversity, but participants reported no digestive discomfort during the study.

The findings suggest that subtle dietary changes, like incorporating corn flour into baked goods, can have meaningful impacts on cardiovascular health without causing digestive issues. The study results are applicable to individuals of all ages, highlighting the importance of incorporating whole grains like corn into a balanced diet for overall health and well-being.

New study reveals how corn flour boosts heart health without major diet changes

The evolution of snacking: How generational preferences are shaping the sector

by Gill Hyslop, August 28, 2024, Food Navigator

Article explores how different generations' snacking habits are influencing the snack industry.

It highlights that younger generations, particularly Gen Z, snack more frequently than older adults, driven by convenience, affordability, and social media influence. Millennials and Gen Z are moving away from traditional three-meal routines, often replacing meals with snacks.

The article also discusses how motivations behind snacking vary, with younger consumers seeking snacks that support their active lifestyles and mental well-being.

Gen Z: They snack more frequently, driven by convenience, affordability, and social media influence. They favour global tastes, comfort foods, and snacks with recognizable ingredients. They also prefer sweeter snacks and show a slightly higher preference for savoury and spicy snacks.

Millennials: Known as foodies, they are invested in lifestyle eating and are enticed by all-natural ingredients and clean labels. They often opt for crackers and snack mixes.

Gen X: They lean toward familiar global flavours and prioritize convenience and reliability, sticking with brands they know.

Baby Boomers: More budget-conscious, they snack as a reward and prefer straightforward flavours with simple, natural ingredients.

Health and wellness is a major driver of snacking trends among younger consumers, who are more health-conscious but still indulge.

The article also highlights three generational trends expected to shape the future of the industry: 1. Kids ages 2-5 are increasingly deciding on their snacks. 2. Wellness-driven snacking needs will grow in younger generations. 3. Millennials' needs will shift toward grab-and-go convenience-driven snacking.

The demand for healthier, more convenient snacks with clean labels and transparent sourcing is growing across all age groups. Recognizing and responding to these trends can help snack producers meet current demands and position themselves for future success.

How generational preferences are shaping the snacks sector

HaruPlate looks to fill gap in healthy snacks for children amid 'pervasive' nutrition issues

Hui Ling Dang, August 22, 2024, Food Navigator Asia

It discusses how HaruPlate is addressing child nutrition needs and parents' concerns through product reformulation and development of fortified treats.

Here are the key points:

Child Food Poverty:

HaruPlate's founder and CEO, Irvin Tan, highlights that child food poverty is a global issue, affecting both low-income and middle- to high-income economies. It results in increased incidence of overweight, stunting, and wasting among children, with significant economic costs.

Product Development:

HaruPlate aims to create products that are easy to use, integrate into people's lifestyles, and align with parents' willingness to spend. The company focuses on addressing parents' pain points, such as juggling time, lack of nutrition knowledge, and picky eaters.

HaruPlate's current offerings include cooking sauces, fruit jams, and ice creams. The ice creams, named Fundaes, are made from fresh fruits and vegetables, contain prebiotic and probiotic fibres, and are suitable for children above 12 months. The company is working on improving the stability, texture, and taste of its ice creams and cooking sauces. They are also increasing the fibre content in their sauces to help raise children's daily fibre intake.HaruPlate is developing a new product called "The Smart Cookie," a chocolate cookie targeted at supporting cognitive function, focus, and immunity.

The cookie contains no sugar, is high in fibre, and is designed to be shelf-stable and mess-resistant.HaruPlate has expanded its reach by selling directly to consumers online and getting its products into supermarkets and specialty grocers. The company has also expanded to Malaysia and plans to continue building on this growth.

Singapore's HaruPlate looks to fill gap in healthy snacks for children amid 'pervasive' nutrition issues

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The article discusses the popularity of makhanas and dry fruits as healthy snacks in India.

Here are the key points:
Makhanas and dry fruits are popular across generations, with 67% of consumers choosing them as their go-to healthy snacks. Millennials and Gen Z are particularly fond of makhanas, with 59% of Millennials and 49% of Gen Z selecting them as their trusted snack.The trend towards healthier snacking is driven by a desire for delicious yet nutritious options.

Consumers are increasingly mindful of their health and the environment. Despite the popularity of healthy snacks, 58% of consumers highlighted high retail costs as a barrier to switching to healthier options.

Savory snacks are preferred by 68% of consumers, with Millennials and Gen Z favouring spicy, adventurous flavours like peri peri, while older generations prefer classic flavours like black pepper. For sweet treats, chocolate is a favourite across all generations.

A significant number of consumers (73%) prefer to read labels for ingredient lists and nutritional value before making a purchase2. This trend is particularly strong among Boomers, with 78% of those over 60 scrutinizing ingredient lists.

India snack trends data: Makhanas and dry fruits top picks for 67% of consumers

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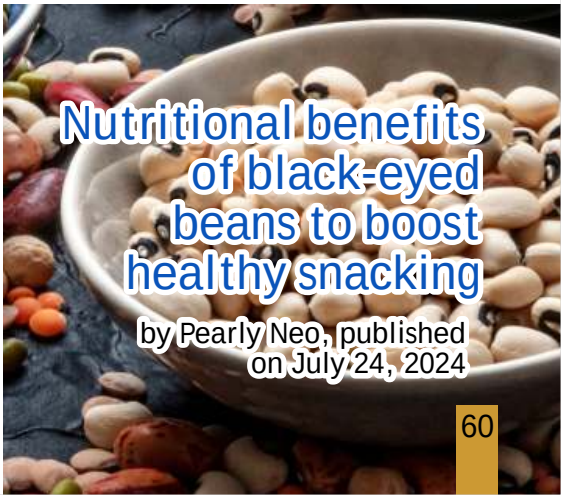
The article highlights the success of tempeh chips made from black-eyed beans in the APAC healthy snacking sector.



Mamame's tempeh chips contain 10g of protein and 12g of fibre per 100g bag, derived naturally from black-eyed beans. This makes the nutrients more digestible and absorbable by the body compared to products using soy protein isolate or chemical compounds.

Tempeh chips offer a longer shelf life and are more transportable and convenient compared to traditional tempeh, which retains the whole bean for fermentation

and has a shorter lifespan at room temperature. Mamame offers six flavours: Original, Sea Salt BBQ, Cheese, Hot Chilli, and Rosemary. Different flavours have varying popularity across markets, with BBQ and Cheese being best sellers in South Korea, and Hot Chilli and Rosemary being popular in Southeast Asia.

Mamame touts nutritional benefits of black-eyed beans to boost healthy snacking

Ajishoya looks to train healthier children's palates with new product lines

Pearly Neo, published on July 9, 2024, Food Navigator Asia

Ajishoya, a spin-off of the Malaysian snack brand BIKA, aims to train children to develop healthier eating habits by introducing clean label organic products targeted at infants and young children.

It has launched a market-first multi-flavoured rice puffs range, where each puff is a single individual flavour made with fruit juice and purees. The puffs come in four different mixes from major fruits like blueberries, strawberries, apples, peaches, and bananas, and are sugar-free.

The Superfoods rice cereal series includes ingredients like bonito, kale, and Chinese yam, providing added nutritional value without the need for extra ingredients. This series is designed to be convenient for parents.Ajishoya has developed a single-serve organic somen noodle line for babies, enriched with various vegetables in each serving. These noodles are designed to help babies learn to chew and develop muscles needed for speech. They are individually packed per serving, contain no salt, and maintain their chewiness even after prolonged cooking.

Ajishoya looks to train healthier children's palates with new product lines

Nutrition industry explores evolving consumer demand to unlock novel nutraceuticals

23 Oct 2024 Nutrition Insight by Jolanda van Hal

In a booming nutraceutical market, companies leverage technology and scientific research to develop innovations that keep up with changing consumer trends and demands for targeted solutions.

Lycored, Gencor, Ingredients By Nature and Lonza Capsules & Health Ingredients tell us how they keep up with market changes and challenges.

By combining nature-based solutions with innovative technology, companies like Lycored and Gencor are meeting the challenges of evolving consumer demands in the nutraceutical industry. These companies are at the forefront of developing new products that address shifting wellness trends, such as personalized nutrition, clean label ingredients, and targeted functional benefits.

The use of advanced technologies, such as nanotechnology and dual-release capsule systems, allows these companies to improve the bioavailability and efficacy of their nutraceutical products. Additionally, sustainability and ethical sourcing practices are becoming increasingly important to consumers, driving companies to find innovative ways to deliver high-quality ingredients while minimizing environmental impact.

As the nutraceutical industry continues to grow and evolve, staying ahead of trends and developments in technology will be crucial for companies to remain competitive. With a focus on nature-based solutions, science-backed research, and innovative delivery formats, companies like Lycored and Gencor are well-positioned to meet the demands of today's health-conscious consumers.

Nutrition industry explores evolving consumer demand to unlock novel nutraceuticals

REGULATORY NEWS

Food labelling update: Researchers call for mandatory access to nutrition information in online shopping

18 Oct 2024 Nutrition Insight by Jolanda van Hal

The absence of accessible, legible food labelling in increasingly popular online grocery shopping "has tangible consequences for public health," according to new research by the Friedman School of Nutrition Science and Policy, US.

Food information, such as nutrition facts, ingredients or allergens, is not always accessible to US consumers when they buy food online.

The lack of consistent and accessible food labelling on online grocery retailers is a barrier to consumers making informed food choices. With only 35.1% of items having the required FDA labels available, accessible, and legible, customers are left in the dark about crucial information like nutrition facts, ingredients, and allergen statements. This poses a significant public health concern as individuals may unknowingly consume foods that are not suitable for their dietary needs or health conditions.

Additionally, the prevalence of marketing claims over essential information further highlights the need for stronger federal regulations to protect consumers in the online grocery shopping space.

The researchers involved in this study are advocating for change in the form of new legislation to compel food retailers to make labelling information easily accessible, or for the US government to provide a public database of packaged foods' nutrition, ingredient, and allergen information.

By closing the gap in federal regulations and ensuring that consumers have access to accurate and comprehensive food labelling online, the researchers believe that public health could be significantly improved.

As online grocery shopping continues to grow in popularity, it is essential that steps are taken to ensure that consumers have the information they need to make healthy food choices.

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Food labeling update: Researchers call for mandatory access to nutrition information in online shopping

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Thailand announces new prepackaged food labelling regulations mandating clarity and manufacturer responsibility

By Pearly Neo07-Aug-2024 –Food Navigator Asia

The Thai government has announced the enforcement of new labelling regulations for pre-packaged food products that emphasise increased information clarity for consumers as well as mandating the inclusion of manufacturer information.

The Thai FDA first announced it would be revamping the regulations for pre-packaged food labels back in September 2023,with an emphasis on expiry dates and allergen warnings.

The new regulations also require manufacturers to provide clear and accurate nutritional information on the labels of pre-packaged foods and beverages. This information must include the energy value, protein, fat, saturated fat, carbohydrates, sugar, sodium, and any other nutrients as specified by the Thai FDA.

Furthermore, the regulations emphasize the importance of maintaining food safety standards by requiring manufacturers to provide information on storage conditions and handling instructions for the products. This is aimed at ensuring that consumers are able to safely consume the products and reduce the risk of foodborne illnesses.

Overall, these new regulations are a significant step towards ensuring transparency and accountability in the food industry in Thailand. By mandating clear and comprehensive labelling standards, consumers can make informed choices about the products they purchase and consume, ultimately leading to a safer and healthier food environment in the country.
https://www.foodingredientsfirst.com/news/us-food-safety-fb-organizations-join-forces-to-get-ahead-of-new-track-and-trace-rules.html

Milk safety advances: Scientists untangle microbial challenges with AI and metagenomics

18 Oct 2024 Food Ingredients First by Insha Naureen

Scientists in the US have combined DNA sequencing and AI to detect anomalies in milk production, such as contamination or unauthorized additives.

The "proof of concept" study can enhance dairy safety measures and has wider implications in the food industry, according to researchers from Penn State, Cornell University and IBM Research.

The use of AI in detecting anomalies in food production, such as antibiotic-treated milk, marks a significant advancement in ensuring food safety and quality control.
By analysing raw milk metagenomes with a depth of sequencing never before achieved, researchers were able to identify microbial drivers associated with anomalies that traditional analysis methods had difficulty pinpointing. The integration of AI tools not only allowed for accurate classification of abnormal samples but also provided insights into the complex and dynamic interactions between microbes in the food supply chain.

The collaborative effort between IBM, Cornell University, and Penn State showcased the power of combining scientific expertise with cutting-edge technology to address issues like food fraud. By utilizing AI technology and the expertise of dairy science researchers, the study provided valuable insights that can be applied to enhance the detection of adulterated food products in the dairy industry and beyond.

With the support of the USDA and a commitment to expanding their research to larger datasets in the future, the team aims to further refine their methodology to improve the specificity and sensitivity of their models for identifying abnormalities in food products or ingredients.

Milk safety advances: Scientists untangle microbial challenges with AI and metagenomics

Natural Trace seeks to combat food fraud, fill gaps in existing traceability tech with DNA-based ingredient

By Hui Ling Dang 19-Sep-2024 Food Navigator Asia

Natural Trace, a Singapore-based company, is tackling food fraud and enhancing traceability with its DNA-based ingredient, NaturalTag.

This innovative solution emerged during the COVID-19 pandemic, addressing the limitations of existing traceability technologies like barcoding and RFID.

NaturalTag is a natural, non-GMO, tasteless, and colourless ingredient that can be added directly to food products.
It allows for comprehensive monitoring and verification of product authenticity through targeted PCR testing and a digital surveillance platform called NaturalCloud.

The importance of traceability has grown, especially with the rise of e-commerce and the complexities of global supply chains. Natural Trace aims to empower consumers by providing transparency and helping responsible producers differentiate themselves.

The company works closely with customers to optimize the solution for their specific needs, ensuring better control, efficient forecasting, and a more resilient supply chain.
NaturalTag has already been commercially applied, and the firm foresees traceability

becoming more widespread due to consumer demand and regulatory responses.

By complementing existing technologies, Natural Trace aims to provide an elegant and inexpensive way to trace a product's journey from farm to fork.

[Singapore's Natural Trace seeks to combat food fraud, fill gaps in existing traceability tech with DNA-based ingredient]

In today's fast-paced world, consumers are constantly seeking health-focused products that fit seamlessly into their busy lives.

Brands and retailers can align with consumers' mental energy around food by creating convenient, health-focused products that cater to their varied lifestyles.

Understanding Consumer Segments

Different generations have different levels of mental energy when it comes to food shopping:

Baby Boomers: Report the lowest impact on their mental energy, with only 6-7% affected. This generation often has more stability and time to prioritize food choices.

Gen Z and Millennials: Experience more stress around food shopping, with 22-28% affected. They expect more from their food in terms of health benefits and value.

Balancing Value, Convenience, and Health

For brands and retailers, balancing value, convenience, and health options with consumers' mental energy adds complexity. Solutions need to be tailored to different household dynamics, such as:

- Households with two working parents and small children.
- Single parents caring for elderly parents.

Leveraging Consumer Insights

Brands and retailers can leverage consumer insights to develop solutions based on their audience. Convenience is layered for consumers, encompassing planning, preparing, consuming, and cleaning.

Emotional Connection with Food

84.51 data reveals deeply emotional language around food, highlighting an opportunity for brands and retailers to address varying levels of convenience through packaging and cooking formats (e.g., frozen versus prepared). Consumers want to do great things for their family, health, and community but often feel they lack the ability to do so. Delivering on these needs can build strong loyalty.

By understanding and addressing these factors, brands and retailers can create products that resonate with consumers' mental energy and build lasting connections.

[How can brands, retailers align with consumers' mental energy around food?]

Article discusses the challenges and strategies in promoting plant-based diets in China.

Here are the key points:

China's Dual Carbon Goals: China aims to reach its carbon emissions peak before 2030 and become carbon neutral before 2060. Reducing meat consumption is part of this strategy.

Challenges in Promoting Plant-Based Diets: Informing consumers about the benefits of plant-based diets is not enough. Factors such as lifestyle habits, nutritional concerns, and taste preferences also need to be addressed. Barriers include perceived lack of freshness, poor taste, ease of cooking, and affordability.

Consumer Attitudes: A study found that 98% of respondents were willing to add more plant-based food to their diet after hearing about the benefits. However, key barriers related to health, taste preferences, and nutrition still need to be addressed to convince them to eat less meat.

Gen Z Attitudes: Health, safety, and nutrition are the top considerations for Gen Z consumers. Negative perceptions about plant-based meat include poor taste, unnaturalness, insufficient nutrition, and safety concerns.

Opportunities for Manufacturers: There are opportunities to enhance public education around healthy and sustainable plant-rich diets. Emphasizing the health benefits of plant-based alternatives is crucial for increased sales. Reducing production costs and optimizing technology to make plant-based foods more affordable can also help increase acceptance.

Health Benefits: Health and nutrition are the benefits related to plant-based food that Chinese consumers agreed most strongly with. Specifically, plant-based diets tend to lower body mass index (BMI), reduce obesity rates, and lower rates of heart disease, stroke, high blood pressure, and high cholesterol.

Future Trends: The future of China's alt-protein sector and the extent to which the country shifts towards sustainable protein consumption will largely depend on the uptake by Gen Z consumers.

China's dual carbon goals: Knowing benefits of plant-based diets 'not enough' to convince people to eat less meat

Food and beverage companies, like Instant Hydration, are using medical advisory boards to validate their ingredient labels and offer transparency to consumers.

Instant Hydration's medical advisory board provides monthly articles on the benefits of the company's proprietary electrolyte blend, which includes French Grey sea salt, calcium from mineralized algae, potassium chloride, and magnesium bis-glycinate chelate. The board also shares the science behind electrolytes and proper hydration, addressing specific health conditions supported by the brand's electrolyte blend.

The expertise of the medical advisory board was instrumental in guiding the formulation process, ensuring that the product is effective and safe. Hydration is a top priority for consumers' beverage preferences, with one in seven beverage launches over the most recent five-year period focusing on hydration. Brands are incorporating added vitamins and minerals for enhanced benefits, and consumers expect functional flavoured water to be refreshing, thirst-quenching, and tasty, while also containing vitamins, minerals, and antioxidants.

Instant Hydration debuts electrolyte packets for refreshment, recovery

FSSAI has issued a notification amending the Food Safety and Standards (Prohibition and Restrictions on Sales) Regulations, 2011.

The amendment primarily focuses on modifying provisions related to the sale of infant nutrition, condensed milk, skimmed milk powder, packaged drinking water, multi-source edible oil and certain other food products.

The notification also omits certain clauses and forms from the original regulations.

The Food Safety and Standards Authority of India (FSSAI) issued a notification on October 17, 2024, amending the Food Safety and Standards (Prohibition and Restrictions on Sales) Regulations, 2011.

This amendment, effective from the date of publication in the Official Gazette, introduces significant changes in the food safety landscape.

Key Changes include:

Relaxation on the sale of infant nutrition and various milk products such as skimmed milk powder, condensed milk: The various milk products can now be sold without the requirement of Bureau of Indian Standards (BIS) Certification Mark over the label.

Relaxation on the sale of packaged drinking water and mineral water: The packaged drinking water and mineral water can now be sold without the requirement of Bureau of Indian Standards (BIS) Certification Mark over the label.

Relaxation on the sale of Multi-Source Edible Oil: The multi-sourced edible oil can now be sold without the requirement of AGMARK certification mark over the label.

These modifications are intended to promote consumer safety, facilitate trade, and foster a more flexible regulatory environment for the food industry.

https://cliniexperts.com/regulatory-update/fssai-amends-food-safety-and-standards-prohibition-and-restrictions-on-sales-regulations/

FSSAI Reinforces Food Safety Compliance amongst E-commerce Food Business Operators (FBOs)

12 NOV 2024

The Food Safety & Standards Authority of India (FSSAI) convened a meeting with e-commerce Food Business operators (FBOs) on Tuesday, November 12th, 2024, under the chairmanship of CEO, FSSAI to reinforce compliance requirements for e-commerce FBOs.

The CEO asked the e-commerce FBOs to adopt practices to ensure minimum shelf life of 30 percent or 45 days before expiry at the time of delivery to the consumer.

CEO, FSSAI also cautioned the FBOs against making unsupported claims online. This would prevent misleading information and protect consumers' right to accurate product details. He highlighted the pivotal role of online platforms in protecting consumer health and promoting transparency. He reiterated the mandate that no FBO can operate on any e-commerce platform without a valid FSSAI license or Registration, emphasizing the critical need for regulatory compliance.

Further, the CEO clarified that any product claims made on e-commerce platforms must align with the information provided on the product labels and in adherence to FSSAI's Labelling and Display Regulations.

In a move to ensure safe food handling at every level, he instructed FBOs to implement proper training programs for delivery personnel, empowering them with essential food safety and hygiene protocols. Additionally, he emphasized the importance of delivering food items and non-food items separately to the consumers to avoid potential contamination.

In his concluding remarks, the CEO, FSSAI underscored the need for all e-commerce FBOs to adhere to food safety standards diligently. He emphasized that a transparent, compliant, and accountable e-commerce food sector is vital for protecting consumer health and fostering confidence in digital food marketplaces.

The session was attended by over 200 participants joined both physically and virtually from across the country, underscoring the significant commitment to strengthening food safety standards within the e-commerce sector.

https://pib.gov.in/PressReleaseIframePage.aspx?PRID=2072832

FSSAI tightens antibiotic limits in food to combat rising threat of superbugs and antimicrobial resistance

New Delhi Indian Express November 4, 2024

India's food safety authority has introduced stricter norms to control antibiotic residues in food products like meat, milk, poultry, eggs, and aquaculture, aiming to tackle the critical issue of antimicrobial

The new regulations from the Food Safety and Standards Authority of India (FSSAI) lower permissible levels of antibiotic residues and expand the list of drugs under surveillance. The changes will take effect on April 1, 2025.

"If enforced strictly, the regulations will ensure safer food products for consumers by setting stricter residue and contaminant limits across a variety of food items and help in dealing with antimicrobial resistance," said George Cheriyan, working president of the Consumers Protection Association (CPA), according to a report by Economic Times (ET).

The report added that the updated regulations also prohibit antibiotics in honey production and reset contamination limits for chemicals like ochratoxin A and deoxynivalenol in wheat, wheat bran, barley, rye, and coffee.

Dr Palleti Siva Karthik Reddy, consultant physician at Koshys Hospital, says, "The implementation of stricter antibiotic residue limits in food is a significant public health intervention aimed at curbing the rising threat of antimicrobial resistance (AMR). AMR occurs when bacteria, viruses, fungi, and parasites evolve and no longer respond to antibiotics, making infections harder to treat and increasing the risk of disease spread, severe illness, and death." A primary driver of AMR is the overuse and misuse of antibiotics, he adds, not only in human medicine but also in agriculture and food production.

"Enforcing stricter antibiotic residue limits comes with numerous challenges, especially in a country as agriculturally diverse as India," says Dr Reddy, adding that one major hurdle is the lack of uniform monitoring and testing infrastructure. "Many small-scale farmers and food producers may not have the resources or knowledge to comply with these new regulations.

In addition, ensuring compliance across decentralised food supply chains, especially in rural areas, poses logistical difficulties."He says that educating farmers and food producers about the long-term benefits of reducing antibiotic use is another challenge.

Evidence from countries that have already implemented bans on antibiotics as growth promoters, such as Denmark and the Netherlands, shows promising results, he continues. By reducing antibiotic use, there is also a "downstream effect" on bacterial ecosystems in the environment. Microbes in the soil and water become less exposed to selective pressures that drive resistance.

https://indianexpress.com/article/lifestyle/health/fssai-antibiotic-limits-food-superbugs-resistance-9652984/

EFSA Explores Processing Effects, Toxicity Testing to Inform Novel Protein Safety Assessments

By Bailee Henderson November 29, 2024

The article "EFSA Explores Processing Effects, Toxicity Testing to Inform Novel Protein Safety Assessments" by Bailee Henderson discusses recent investigations by the European Food Safety Authority (EFSA) into the effects of processing methods on proteins in novel and genetically modified foods.

The findings were published in the November 2024 issue of EFSA Supporting Publications. Key points from the article include:

• Processing Methods: Researchers reviewed existing food and feed products made with genetically modified crops and novel foods, mapping their processing steps. They found that certain processes, such as thermal treatments, fermentation, and enzymatic hydrolysis, can enhance protein digestibility and improve nutritional properties.

• Protein Safety: Heating processes can reduce the activity of newly expressed proteins and decrease immunoglobulin E (IgE) reactivity, which is associated with allergic reactions.

• Toxicity Testing Framework: EFSA developed an in vitro toxicity testing framework for novel proteins, which could serve as an alternative to animal studies. This framework includes an initial in silico toxicity prediction, followed by in vitro assays to address primary mechanisms of toxicity, and, if necessary, the use of relevant in vitro model systems to explore potential target organ toxicity.

https://www.food-safety.com/articles/9936-efsa-explores-processing-effects-toxicity-testing-to-inform-novel-protein-safety-assessments

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The complexities brands face when marketing foods and ingredients for mood management.

It emphasizes the importance of understanding functional claims, relying on strong scientific evidence, and staying informed on emerging trends to market products effectively and compliantly.

The functional food and beverage market is expected to grow significantly, reflecting the preferences of health-conscious consumers. Brands must ensure their claims are appropriate for the product category and avoid drug claims, which suggest the product can treat specific diseases or health conditions.

The FDA allows three types of claims:
1. Nutrient content claims: Based on specific nutrient levels (e.g., "good source of vitamin E").
2. Health claims: Refer to a reduction in disease risk and are more strictly regulated.
3. Structure-function claims: Refer to claims like aiding digestion but must be based on the nutritional value of the product.

Claims must be adequately substantiated and aligned with both FDA and FTC requirements. Brands must provide competent and reliable scientific evidence to support health benefit claims, typically through well-controlled human clinical studies.

Ensuring compliance for functional claims

The challenges faced by the food industry in implementing new US FDA traceability requirements set to take effect on January 20, 2026.

These requirements mandate that manufacturers, processors, packers, and holders of certain foods maintain key data elements associated with critical tracking events, such as harvesting, cooling, packing, shipping, and receiving.

Key points from the article include:
Complexity of Implementation: The new rule requires significant changes to processes and procedures, including the establishment of new communication platforms to share product traceability information between industry members and the FDA.

Technological Challenges: There are concerns about the overuse of new technologies, which could lead to excessive costs and integration issues. Stakeholders are urged to consider existing frameworks before adopting new technologies.

Collaboration Needs: Increased collaboration among stakeholders is essential to address interoperability challenges and ensure consistent data structure. Retailer Demands: Some retailers are expanding the list of products that need to be tracked, adding to the burden on companies already struggling to meet the basic requirements.

Staged Approach: A collaborative staged approach is recommended to ensure all stakeholders are on the same page and to account for variables in the supply chain.

Over-eager retailers, excessive tech threaten Food Traceability Rule compliance

Consumer pressure for certification is driving regulation change

Consumer demand influences the rise of certifications and regulations in the food and beverage industry.

Key points include:

Consumer Influence: Certifications like Rainforest Alliance and Fairtrade are developed in response to consumer pressure. Consumers' buying preferences drive companies to adopt certifications that align with their values.

Certification Topics: Certifications cover various topics, including product healthiness, environmental sustainability, and supply chain wellbeing.

Trade-offs: There are trade-offs between different concerns, such as health and sustainability. For example, organic certifications require refraining from pesticides, while regenerative agriculture may require their use.

Regulations vs. Certifications: Regulations, unlike voluntary certifications, are mandatory and often predated by certifications. Both require compliance with certain standards, but regulations demand more comprehensive traceability.

Consumer pressure behind rise of food certifications

How to effectively label your food product

A comprehensive guide for start-ups on how to legally and effectively label new food products.

Here are the key points:

Accurate Description: Ensure the food product is accurately described on the packaging, including any additional instructions.

Ingredients List: Include a full list of ingredients, with any known allergens highlighted. The 14 known allergens include celery, cereals containing gluten, crustaceans, eggs, fish, lupin, milk, molluscs, mustard, peanuts, sesame, soybeans, sulphur dioxide and sulphites, and tree nuts.

Date Labels: Include a 'best before' or 'use by' date. The 'use by' date is about safety, while the 'best before' date is about quality.

Health Warnings: Clearly detail any necessary health warnings, such as 'not suitable for pregnant women'.
Storage Information: Provide information on how the product should be stored, such as whether it needs to be frozen or refrigerated once opened.

Net Quantity: Include net quantity information, which is essential for both retailers and consumers.

Country of Origin: Declare the country of origin, which can add authenticity to your brand and be used as part of your marketing.

It's crucial to get your labelling approved by experts in the country where you intend to sell your product to ensure compliance with necessary regulations.

Essential legal labelling guide for new food start-ups