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FOOD, NUTRITION & SAFETY MAGAZINE

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GLP-1 THERAPIES: MIRACLE CURE OR RISKY TREND?

Obesity and type 2 diabetes are on the rise globally. Considering both diseases leading to even worse conditions, it is better to contain them before it is too late. Both could be controlled gradually by controlling diet and with regular physical activity. However, both need a lot of patience, persistence, restraint and discipline, the absence of these very things causes the onset of the above diseases. There is a quick solution now available which people love to try as it involves very little pain and a lot of immediate gain. The name of this magic bullet is GLP-1 drugs.

Global GLP-1 drug market has shown explosive growth recently, driven by rising rates of obesity and diabetes. Current market of about US$ 62.2 billion in 2025 is expected to reach US$ 157.5 billion in a decade. Its market in India is also racing with one drug crossing 1,000 crores in 2025 despite being expensive.

This has also generated opportunities in food and beverage industry with GLP-1 friendly foods. There is a reason for such foods as the medical treatment involves a very powerful drug that cannot just give quick benefit, but also if not cautious enough, may cause a lot of damage to health.

Some of the problems include weight regain, loss of muscle mass, many side effects and some less common problems affecting organs like pancreas, gallbladder, kidney and thyroid. Such serious consequences demand that the GLP-1 weight loss should not just be under strict supervision of a medical professional but also under constant advice of a registered dietician. There is a need for an inclusion of high-protein diet, which under proper administration can prevent serious problems caused by the medication.

Medication reduces appetite, reducing the caloric and food intake drastically and bringing about fullness of stomach rapidly. Unless essential nutrients are compensated, there would be onset of many problems and deficiencies. Also, once the medication is stopped, if the person goes back to his/her routine of high caloric intake combined with inadequate or lack of physical exercise, the lost weight could be regained.

The sensible route would be as mentioned above, reducing calories by avoiding excess of carbs and fats without cutting essential nutrients and simultaneous increase in physical activity. This is tedious and slow and needs a lot of determination along with the behavioural change in diet. Although this approach produces slower results, there are lesser dangers and the change is more permanent.

With our professionals who are changing their lifestyles, we are getting into a situation with quick-fixes that seem necessary and easier to adopt. We will see a quicker surge in market for such medications and supporting foods in future and we can only forewarn of dangers so proper precautions are taken to avoid the serious problems.

Prof Jagadish Pai, Editor, PFNDAI

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INTERESTED GROUPS AND GROUP INTERESTS ARE NOT THE SAME

AUTHOR
Dr Joseph I Lewis,
Chairman, Scientific Advisory Committee, PFNDAI

A consumer advocacy group called out for 'safeguarding the independence of FSSAI, and advising the need to reconsider the scope of stakeholder consultations', restricting business involvement and to distinguish the regulatory process from their participatory engagement.

It said, the Act does not envisage joint framing of regulations with 'industry', nor does it provide for stakeholder consultations as a 'binding process in regulatory development. A proper reading of the Act and its statutes (u/s 13-18) should debunk these misconceptions.

The language of advocacy often portrays altruistic motives, which is good, but so does the law in establishing equity among all participants. At its core, the statutes mandate transparency, credibility and certainty in how decisions are made and include all stakeholders.

So, what better than such a legal framework to safeguard FSSAI from interests, but not interested groups?

An engagement model brings together a broad range of expertise to ensure that measures taken are proportionate to consumer safety and fair-trade practice. These models exist in Codex, the US FDA, and the EU.

National delegations to Codex often include representatives from industry and consumer organisations. The FSSAI subsequently adopts the very same standards. How is Codex's independence safeguarded? Parliament enacted a similar model for India (FSSA, 2006).

Few, if any, have recognised FSSA's structured stakeholder engagement approach. Two questions arise: (a) why deny access to a range of experts, wherever they are; (b) why do such models work elsewhere, but not here?

Meanwhile, several organisations, businesses, and regulatory departments, such as CDSCO, advocate for models that allow relevant participatory knowledge before regulatory decisions are made.

Policymakers encourage regulatory reform to overcome excessive regulation and want every standard subjected to a regulatory impact analysis (RIA). Ineffective regulations create a regulatory maze and increase the enforcement burden.

To some, standards are seen as a way to control wayward entities, and these should be kept from the standard-setting process. On the other side, anything not in the standard is a door to be opened.

Partisan attitudes are always present, with both Industry and consumer groups seeking to influence outcomes.

Although the law declared vitamin and mineral health supplements in dose form as foods, some continue to see them as drugs, nudging for the shift. Another controversy arose over affixing ORS, a priority WHO medicine for childhood diarrhoea, on drink and beverage product labels, holding a food licence.

The public impression is that laws governing these two areas are inadequate to resolve such challenges. Administrations do not deliberately 'confuse' food with drugs, but are challenged by the consultative process.

Authoritative setups are unaccustomed to democratic engagement models of Codex and FSSA, where sifting grain from the chaff is required. ORS and shifting health supplements to drugs are prime examples of sectarian interests.

Listening to these should immediately reveal whether there is relevant science, acceptable evidence, or compliance with applicable statutes. The mandate for framing standards (u/s18) invites interested parties, but not their interests.

The Authority should do a better job of identifying them. While reform is yearned for, when it arrives, it is unnoticed, unrecognised and every kind of expertise - whether familiar with the law or not- feels free to 'repair it. What survives is the law and its participants.

However, pressures, compromises and loopholes undermine the core of FSSA, until it becomes a shadow of its true self. This is not a weakness of the FSSA model, but a failure of the regulatory roundtable.

FOOD EMULSIFIERS: THE HIDDEN ARCHITECTS OF FOOD STRUCTURE

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Introduction: Molecular Design Behind Modern Food products

Food products consumed today ranging from soft pan breads and aerated cakes to smooth chocolate, stable margarines, and creamy frozen desserts are complex, multiphase systems. Their structure, stability, shelf life, and sensory quality depend on carefully controlled interactions between fats, water, proteins, carbohydrates, and air. At the core of this control lies a class of functional ingredients that operate at molecular and supramolecular levels: food emulsifiers.

Although used at low concentrations, food emulsifiers exert a disproportionately large influence on product performance. They function as interfacial modifiers, crystallization regulators, protein–lipid interaction agents, and foam stabilizers. From a food technology perspective, emulsifiers should therefore be viewed not merely as additives, but as structural design tools that enable reproducible manufacturing and consistent quality.

The global food emulsifiers market reflects their importance. Valued at approximately USD 3.9 billion in 2024, it is projected to reach about USD 5.6 billion by 2033, with a CAGR close to 4%. Growth is driven by expansion of bakery, confectionery, dairy, frozen dessert, and convenience food segments, particularly in emerging economies such as India, China, and Southeast Asia. For the Indian food industry, emulsifiers play a critical role in balancing product quality, cost efficiency, shelf life, and regulatory compliance.

This article presents a technical overview of food emulsifiers, covering their fundamental chemistry,

2 cups of Bournvita contains 50% RDA of Vitamin D, Iron and Zinc that support bones, cognitive and immune function thus supporting strength. For children (7-9 yrs.), ICMR -NIN, 2020. For more details, refer to the pack.

mechanisms of action, and applications across key food categories, with relevance to food scientists, technologists, and nutrition professionals.

Fundamental Chemistry: Amphiphilicity and Interfacial Activity

Food emulsifiers are surface-active amphiphilic molecules containing both hydrophilic and lipophilic moieties within the same structure. The hydrophilic portion may consist of ionic or non-ionic groups such as hydroxyl, carboxyl, phosphate, or polyoxyethylene units, while the lipophilic portion is usually derived from long-chain fatty acids or hydrocarbon chains.

This dual affinity allows emulsifiers to adsorb spontaneously at oil–water or water-oil interfaces. Upon adsorption, they reduce interfacial tension and lower the free energy of the system, facilitating the formation of finely dispersed droplets or air cells during processing operations such as mixing, homogenization, whipping, or extrusion.

From a thermodynamic standpoint, emulsions are inherently unstable. Emulsifiers do not render emulsions thermodynamically stable; instead, they impart kinetic stability by retarding destabilization processes such as creaming, sedimentation, flocculation, coalescence, and Ostwald ripening. This kinetic stabilization is essential for maintaining product integrity throughout processing, storage, transportation, and consumption.

Mechanism of Action in Food Systems

The functional performance of emulsifiers arises from several overlapping mechanisms:

1. Reduction of interfacial tension, which facilitates droplet breakup during homogenization and mixing.
2. Formation of cohesive interfacial films around fat droplets or air cells, providing mechanical strength to dispersed phases.
3. Electrostatic and steric stabilization arising from charged or bulky head groups, which prevent droplet aggregation.
4. Interaction with biopolymers such as proteins and starch, influencing hydration, aggregation, and network formation.
5. Control of fat crystallization, including nucleation, crystal growth, and polymorphic transitions.

In real food systems, these mechanisms operate simultaneously. The net functionality of an emulsifier depends on its molecular structure, concentration, processing conditions, and interactions with other ingredients.

Classification of Food Emulsifiers

Natural Emulsifiers -

Natural emulsifiers are derived directly from biological sources. Common examples include lecithins obtained from soy, sunflower, or egg yolk; milk proteins such as casein; and certain polysaccharides. Lecithin, a complex mixture of phospholipids, is widely used due to its good emulsifying capacity and favourable consumer perception.

However, natural emulsifiers often exhibit batch-to-batch variability because of differences in crop variety, climatic conditions, and extraction processes. This variability can lead to inconsistent functional performance in industrial formulations that demand tight process control.

Synthetic and Nature-Identical Emulsifiers -

Synthetic emulsifiers are produced under controlled industrial conditions using

food-grade raw materials such as fatty acids, glycerol, sorbitol, and polyglycerols. Examples include mono- and diglycerides of fatty acids, sorbitan esters, and polyglycerol esters.

These emulsifiers offer consistent chemical composition, predictable performance, and the ability to tailor functionality for specific applications. As a result, they are widely used in large-scale food manufacturing where reproducibility and robustness are critical.

Why Synthetic Emulsifiers Are Widely Used

The dominance of synthetic emulsifiers in modern food processing is driven by technical and economic considerations rather than by shortcomings of natural alternatives. Key advantages include consistency of quality, reliable year-round availability, and competitive cost structures. Controlled synthesis ensures uniform molecular architecture and batch-to-batch reproducibility, which are essential for maintaining consistent texture, shelf life, and sensory quality in finished products.

Synthetic emulsifiers can also be designed to perform under a wider range of processing conditions, including high shear, broad pH ranges, and elevated temperatures. In addition, many exhibit superior oxidative and microbiological stability, contributing to extended shelf life and reduced food waste.

All permitted emulsifiers are subject to rigorous toxicological evaluation and are regulated under national and international food safety frameworks, including those of the Food Safety and Standards Authority of India (FSSAI) and Codex Alimentarius.

Functional Roles in Oils and Fat-Based Products

In products such as margarine, spreads, peanut butter, and salad dressings, emulsifiers are essential for maintaining stable dispersions of aqueous and lipid phases. They prevent oil separation, reduce creaming and coalescence, improve water-holding capacity, and enhance spreadability.

Peanut butter formulated without emulsifiers often separates into oil and solid phases within days, whereas emulsifier-stabilized products can remain homogeneous for several months under ambient storage conditions.
In margarine, emulsifiers also influence the fat crystal network, contributing to plasticity, smooth mouthfeel, and resistance to oiling-out during storage.

Emulsifiers in Dairy and Non-Dairy Frozen Desserts

Ice cream and non-dairy whipped toppings are among the most complex food systems, comprising air cells, fat droplets, ice crystals, and a concentrated serum phase. Emulsifiers play a central role by partially destabilizing fat globule membranes, thereby enabling controlled fat agglomeration during freezing.

This controlled destabilization strengthens air cell walls, improves overrun, enhances resistance to meltdown, and limits ice crystal growth during storage and temperature fluctuations. Collectively, these effects result in improved creaminess, smooth mouthfeel, and better heat-shock stability during distribution.

Bakery Applications: Dough Conditioning and Structural Development

Bakery products represent one of the largest application segments for food emulsifiers. In bread and cakes, emulsifiers interact strongly with wheat gluten proteins and starch granules.

By aligning with hydrophobic regions of gluten proteins, emulsifiers promote the formation of a more elastic and cohesive gluten network. A stronger gluten network improves gas retention during fermentation and baking, leading to higher loaf volume, improved symmetry, and a finer, more uniform crumb structure.

Emulsifiers also improve dough machinability, reduce stickiness, and increase tolerance to process variations. In addition, certain emulsifiers retard starch retrogradation, thereby delaying crumb firming and extending freshness during storage.

Confectionery and Chocolate Applications

In chocolate and sugar confectionery, emulsifiers are essential for controlling viscosity, flow behaviour, and fat crystallization. By influencing crystal nucleation and polymorphism, emulsifiers help achieve desirable product attributes such as gloss, clean snap, smooth mouthfeel, and resistance to fat bloom.Fat bloom is often associated with uncontrolled fat recrystallization and polymorphic transitions. Appropriate emulsifier selection can help stabilize the desired crystal form and improve shelf stability of chocolate products.

Aerated Products and Foam Stability

Whipped toppings, mousses, and cake creams rely on stable foams for structure and volume. Emulsifiers stabilize air–liquid interfaces, strengthen lamellae, and slow down disproportionation and drainage, thereby preventing foam collapse during storage.

In many formulations, blends of emulsifiers are used to balance aeration, stability, and mouthfeel. This underscores the importance of formulation expertise and a sound understanding of emulsifier–ingredient interactions.

Regulatory and Industry Perspective

In India, food emulsifiers are regulated under the Food Safety and Standards Authority of India, with specifications and permissible limits broadly aligned with Codex Alimentarius and international standards. For food manufacturers, regulatory compliance, labeling requirements, and consumer perception must be carefully balanced with technical performance and cost considerations.

Future Directions

Future developments in food emulsifiers are likely to focus on improved functionality at lower dosages, compatibility with plant-based and alternative protein foods, and sourcing from sustainable and renewable raw materials. Advances in lipid chemistry, interfacial science, and processing technology will continue to expand their functional potential.

Conclusion

Food emulsifiers are foundational to modern food science and technology. By controlling interfacial phenomena, biopolymer interactions, and fat crystallization, they enable the production of safe, stable, and high-quality foods at industrial scale. Although largely invisible to consumers, emulsifiers remain indispensable tools for food technologists striving to meet evolving market, regulatory, and nutritional demands.

WHOLE GRAINS: WHY INDIA SHOULD CARE AGAIN: PART 1

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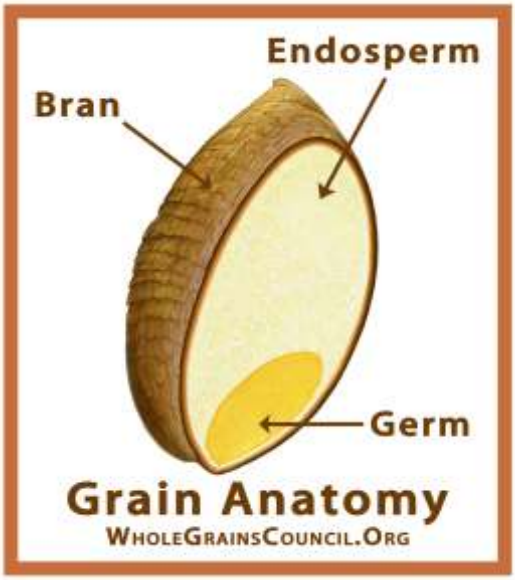
Introduction to Whole Grains

Grains have been a fundamental component of human diets since the earliest development of agriculture (1). Whole grains consist of the entire grain kernel retaining the bran, germ, and endosperm. The bran and germ are especially rich in dietary fibre, micronutrients (like B-vitamins, iron, magnesium), phytochemicals, and healthy fats. The dietary fibre and bioactive compounds in whole grains slow glucose absorption and improve satiety, and they support healthy gut function, weight regulation, and metabolic control.

Scientific evidence has consistently associated higher whole grain intake with lower risk of chronic diseases including type 2 diabetes (T2D), cardiovascular disease (CVD) and reduced overall mortality. Meta-analyses of prospective cohort studies show that individuals with high whole grain intakes have a significant reduction (e.g., ~21–26%) in risk for T2D and CVD compared with low consumers, even after adjusting for other risk factors (2).

The structural integrity of whole grains - with bran and germ intact - is the key nutritional advantage. Most vitamins and minerals are found in the germ and bran portion of grains. Fibre improves insulin sensitivity and helps regulate blood sugar; micronutrients and antioxidants may reduce oxidative stress and inflammation; and whole grains tend to have a lower glycaemic index compared to their refined counterparts (2).



According to the Food and Agriculture Organization (FAO) of the United Nations, Wholegrain foods are foods made with grains which have been through some processing, but still have most of their nutrients (3).'' While the Whole Grains Council further elaborates that: 'Whole grains or foods made from them contain all the essential parts and naturally-occurring nutrients of the entire grain seed in their original proportions. If the grain has been processed (e.g., cracked, crushed, rolled, extruded, and/or cooked), the food product should deliver the same rich balance of nutrients that are found in the original grain seed(4).

Ancient Whole Grains of India

India's agricultural heritage historically included a diverse set of whole grains that were staples long before modern processing became widespread. These ancient grains are not only culturally rooted but also nutritionally dense.

The most significant include:

- Whole Wheat (Atta): when consumed as intact, whole flour retains more fibre and nutrients (5,6).
- Finger Millets (Ragi): rich in calcium, fibre and antioxidants.
- Pearl Millet (Bajra): good source of complex carbohydrates and iron.
- Sorghum (Jowar): high in fibre, B-vitamins and phytochemicals.
- Foxtail, Little, Kodo, Barnyard, Proso Millets: smaller cereals with high dietary fibre and micronutrients relative to refined staples.
- Traditional Brown or Unpolished Rice Varieties: retains bran and germ.

These grains were historically integral in regional dishes from ragi-based dosas in Karnataka to bajra roti and sorghum flatbreads across central and western India and has contributed to significant macro- and micro-nutrients in rural diets. Government initiatives like recognising millets as 'Nutri-cereals' underline their role in nutritional security, yet consumption remains sporadic in many regions, especially urban areas (7).

India's Slow Shift from Whole Grains to Refined Staples

In post-Green Revolution India, polished white rice and refined wheat flour (Maida) gained dominance due to mechanised milling, urbanisation, supply chain prioritisation, and cultural perceptions associating "white" staples with modernity and affluence.

A recent ICMR–INDIAB national survey found that Indian diets derive ~62% of energy from carbohydrates, with the majority coming from refined cereals such as white rice and refined wheat flour, along with added sugars. Whole millets and brown rice contribute only a small share of total energy, despite their nutritional benefits (8).

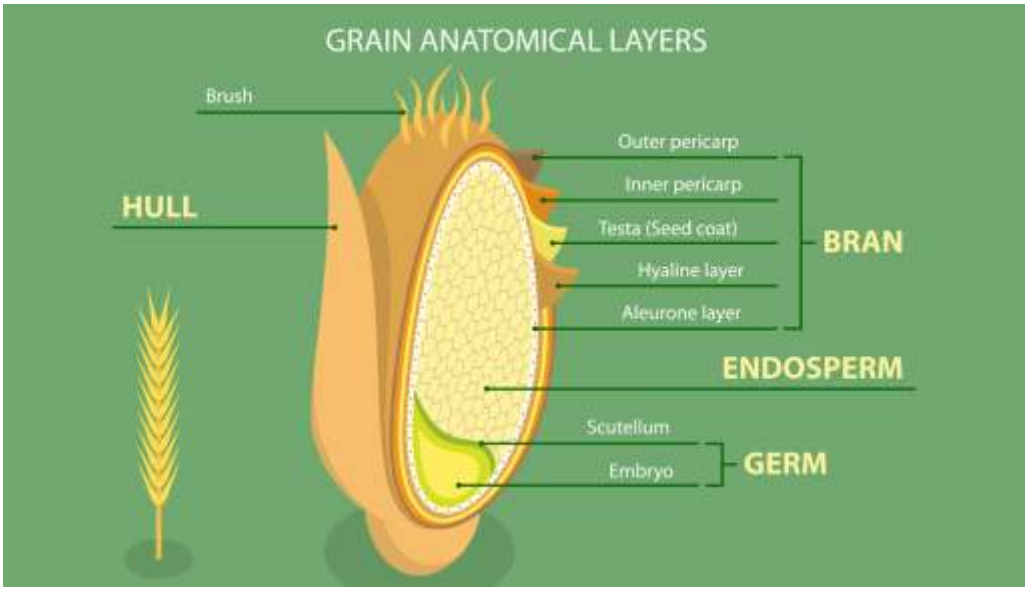
The transition to refined staples is uneven across the country. In the Northeast, white rice supplies nearly all cereal intake, while Southern states also show high reliance, though regions like Karnataka and Gujarat demonstrate higher relative whole grain and millet consumption (8).

Enduring Value

INDIA'S No.1 ATTA BRAND*

AASHIRVAAD

*AASHIRVAAD ATTA is the top Atta brand by penetration and volume share on Branded Atta Category in All India (Urban + Rural), for the period October 2024 to September 2025, according to Worldpanel by Numerator's household panel.



Source: Dietary Fibre from Whole Grains and Their Benefits on Metabolic Health.

Consumer behaviour surveys reveal that while awareness of millets is rising, actual consumption is still low: a majority of households consume millets only occasionally, often due to taste preferences, lack of familiarity, and perceived cooking inconvenience (9).

What Are Refined Grains?

Refined grains are grains that have had the bran and germ removed during processing, stripping away fibre and most micronutrients. Refined grains deliver primarily starch and calories with limited fibre, micronutrients, or phytochemicals, contributing to rapid post-meal glucose rises. This can exacerbate metabolic stress in vulnerable populations like those with prediabetes or metabolic syndrome (8).

Introduction to Whole Wheat: More than Just a Staple

Wheat (Triticum aestivum L) is among the most important and widely cultivated cereal crops in the world. It serves as a staple food for a large proportion of the global population and is a major source of carbohydrates, proteins, and other essential nutrients. Wheat cultivation began nearly 10,000 years ago, coinciding with the early development of agriculture (10).

A wheat kernel comprises on three principal components—85% endosperm, 13% bran, and 2-3% germ(11). Wheat contains many nutrients and phytochemicals, which makes it important in functional and nutritional aspects.

Because of rising urbanization, shifting dietary habits, and population growth, there is an ongoing demand for wheat. By the year 2050, to cover the expected food demand of a world population that will increase by 60%, there will be an increase in the demand for wheat at a rate of about 1.7% per year(12).

India's global position and Dominance in Wheat Market

India is *second largest producer of wheat in the world after China* with about 15% share in total world's wheat production. Currently, India maintains a surplus in wheat production positioning the country as a potential exporter in the global wheat market. The three wheat species commercially cultivated in the Indian Subcontinent are:

- *Triticum aestivum* (bread wheat): 95%
- *Triticum durum* (macaroni wheat): 4%
- *Triticum dicoccum* (Emmer or Khapli wheat) about 1%.

These species cater to India's diverse culinary map, reflecting the country's remarkable food culture. Wheat is the one of the principal staple foods of north Indian population. The grains are typically milled into flour (atta) and consumed predominantly in the form of chapati, roti or leavened bread. Soft wheat is used for making chapati,

bread, cake, biscuits, pastry and other bakery products whereas hard wheat is used for manufacturing rawa, suji, and sewaya. In areas where rice is a staple food grain, wheat is also consumed in the form of puri etc. Besides dietary consumption, Wheat grain is also used for preparing starch and wheat straw is used as fodder, padding material and mulching material(13).

Nutritional Composition of Wheat Flour Per 100g;

Food Name	Energy (Kcal)	Protein (g)	Fat (g)	Carbohy-drate(g)	Fibre (g)
Whole Wheat Flour Atta	320	10.5	1.5	64.17	11.36
Refined Wheat Flour Maida	351	10.3	0.7	74.27	2.76

Source: IFCT 2017(14)

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ULTRA-PROCESSED FOODS AND NCDs IN INDIA: EVALUATING THE EVIDENCE FOR POLICY DECISIONS - PART 2

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Introduction:

The Economic Survey of India (2025) has discussed the effect of lifestyle as a cause for increasing incidence of the four major NCDs: cardiovascular diseases (CVDs), cancers, chronic respiratory diseases (CRDs), and diabetes. The opinion expressed is that reducing excess calorie intake and improving dietary quality may help prevent many primary and secondary cardiovascular events (1).

Non-communicable diseases (NCDs) represent a significant health challenge globally, characterized by chronic conditions that are not transmissible from person to person. These diseases encompass a wide range of health conditions, including cardiovascular diseases, cancer, chronic respiratory diseases, and diabetes. Unlike communicable diseases, which often spread through pathogens, NCDs typically develop gradually over time and are strongly influenced by various factors such as lifestyle choices, environmental exposures, and genetic predispositions (2).

India, like many other countries, is undergoing a notable epidemiological transition marked by a notable increase in the prevalence of NCDs. This transition is fuelled by several factors, including rapid urbanization, shifts in dietary habits, sedentary lifestyles, and the aging of the population. As a result, there has been a considerable rise in the burden of NCDs across the country (2).

The term ultra-processed food includes majority of the Processed foods approved by FSSAI. For definition of Ultra Processed Foods (UPF) reference has been made (in the Economic Survey of India 2025) to the NOVA food classification system which categorizes UPFs broadly as ready-to-eat products characterized as industrial formulations composed of substances extracted from food, along with additives for taste enhancement (Box 1) (3).

TRY

Saffola Oats

Soft & Creamy Oats

Creative Visualization. $Based on Kantar Household Panel data.
For more details please visit https://saffola.marico.in/; www.marico.com

Box 1: NOVA Classification system (ref: Monteiro etal 2016)

Group I: Unprocessed or minimally processed food
Examples: vegetables, fruits, muscle, offal, eggs, milk, mushroom, seaweed

Group II: Processed culinary ingredients; substances obtained directly from group 1 foods or from nature by processes such as pressing, refining, grinding, milling, and spray drying
Examples: salt, butter, oil, starch, sugar, atta, rice, milk powder

Group III: Processed food; products manufactured by industry with the use of salt, sugar, oil or other substances (Group 2) added to natural or minimally processed foods (Group 1) to preserve or to make them more palatable
Examples: Canned products, pastes, cheese, unpackaged bread, fermented alcoholic beverages, salted nuts etc

Group IV: Ultra-processed foods; Industrial formulations made entirely or mostly from substances extracted from foods (oils, fats, sugar, starch, and proteins), derived from food constituents (hydrogenated fats and modified starch), or synthesized in laboratories from food substrates or other organic sources (flavor enhancers, colors, and several food additives used to make the product hyper-palatable). Manufacturing techniques include extrusion, moulding and preprocessing by frying.
Examples: packaged snacks, biscuits, ice creams and frozen desserts, chocolates, carbonated beverages, Ready to eat, ready to cook products, breakfast cereals, infant food etc

There is no Indian food or diet data which directly implicates Indian UPF with NCD. Unlike the western countries, Indian even now, leans heavily on home cooked foods with total processed food accounting for about 20% of consumption by value and a disproportionately higher NCDs. This creates a genuine case to examine the scientific literature related to consumption of Ultra-processed Foods in India.

Scientific literature related to consumption of UPFs in India

A comparative cross-sectional study was conducted across Pune, India, with 100 individuals with type 2 diabetes (T2D) and 208 without diabetes. A detailed FFQ (Food Frequency Questionnaire) developed by NOVA-UPF Screener with 33 ultra-processed food items was used to evaluate the consumption patterns of UPF. The study included 308 participants from only Pune City, India, of either sex and age group 20–60 years. Confirmed T2D subjects (100) were recruited as per their medical records or physician diagnosis with a minimum of 1 year of disease. Non-diabetics (208) were selected based on the absence of any known medical condition. There was no significant difference in the dietary choices of both groups Comparative analysis showed that UPFs were consumed slightly less by individuals with diabetes than those without diabetes. About 51% individuals with diabetes ate packaged food only once a week, 13% more than once a week, 26% daily, and 10% never consumed packaged food, whereas, in the case of individuals without diabetes, 15.8% ate daily, 38.9% once a week, 35.6% more than once a week and 9.6% did not eat UPF (4).

In another data obtained, a survey was conducted among 630 young adults in Puducherry in South India to determine the contribution of ultra-processed foods (UPFs) to overall macronutrient intake and to explore the perceptions regarding UPF consumption.

Table 1: Food consumption pattern among young adults in South India (ref: 5)

Sr. No.	Food category	%
1.	Cereals, roots , tubers	38.3
2.	Vegetables	19.7
3.	UPF	14.2
4.	Pulses	9.6
5.	Fruits	9.2
6.	Meat, Poultry and fish	6.4
7.	Dairy products	4.5
8.	Egg	3.8

Dietary data from previous day were collected using a Google Form-based tool. Carbohydrates formed the biggest portion of the diet (38%) including cereals, roots and tubers while UPF was 14% (Table 1).

The most consumed UPFs were biscuits, wafers (25%), and potato chips (16.2%). No significant association was found between anthropometric measures and UPF consumption. UPF contributed 9.3% of total energy intake and 2.8% protein, 9.9% fat, and 9.9% carbohydrates as compared to highest percent energy intake from UPF in USA and UK (generally >50%), and 17% energy intake in the north Indian city New Delhi (6). The study in Delhi included total of 589 adults in the age group 20–40 years belonging to upper-middle-income group and high-income group, who engaged in the purchase of packaged and ultra-processed food items. All participants consumed starchy staples, other fruits and vegetables and legumes, nuts and seeds; 95% of the particpants consumed milk and milk products. Ultraprocessed foods contributed to 17 % of total energy intake,12 % of protein, 17 % of carbohydrate, 29 % of added sugar,20 % of total fat and 33 % of Na intake in the diet. (6)

Report on a systematic PubMed conducted to quantify UPF consumption and investigate its sociodemographic correlates in four countries of South Asia was published in 2025 (7). The findings were that UPF consumption varied across South Asia by socio-demographic factors including age, gender, and education. Commonly consumed UPFs in each region were sweetened beverages in Pakistan, salty snacks in South India, breakfast cereals in Bangladesh, and biscuits. Across all region, processed foods dominated dietary intake while UPFs contributed to 11% of total energy intake on average.

In Pakistan and Sri Lanka, younger age was associated with UPF consumption whereas in Bangladesh and North India, the age group was older. Across all regions except Bangladesh, women were more likely to consume UPFs (by 20% on average).

Among UPF consumers, across all regions, married or cohabiting individuals consumed (0.98:1) less UPFs than single individuals and in Bangladesh and Sri Lanka UPF consumption was higher in rural residents (1.06:1)as compared to urban residents. Across all regions, being in paid employment (approximately 10% higher in number than not in paid employment) was not associated with increase in UPF consumption .

The purchase trends of eight distinct categories of processed foods and beverages between 2013 and 2017 was studied using a unique, large and demographically representative dataset from 'Kantar - Worldpanel Division, India' on take-home purchases of packaged food and beverages by urban Indian households.

The focus was on urban areas motivated by their considerably higher levels of obesity and overweight in comparison to rural areas. The data recorded covered only the volume of purchases and does not include information on monetary expenditure. The analysis showed substantial variations in the purchase level of processed foods and beverages across states as well as variability of trends within states over time. Beyond dietary staples (processed wheat, oils, milk) per capita take-home purchases of processed food and beverages are relatively low and infrequent, particularly in comparison to middle-income and high-income countries. Sweet snacks, salty snacks, edible oils and 'other processed foods' (Table 2) were the main categories of foods where volume of purchases have increased over time whereas soft drink purchases and dairy products beyond milk showed a slight decline (8).

In conclusion, the analysis showed varying levels of packaged and processed food purchases as well as heterogeneous patterns over time and across the urban areas of the Indian states. Beyond dietary staples (wheat, oil, milk) the level of purchases of other packaged and processed foods and beverages was low (table 3). A rising level of purchases of sweet snacks (by 17%), salty snacks (by 9%), edible oils and 'other processed foods', contributing to increasing intake of sugar, salt and fats, could be a concern from public health perspective. The limitation of this study is the inclusion of daily essentials such as atta, milk, edible oils among processed food. In urban areas, these products are available as packaged products due to distance between source of the product and consumers (8).

Consumption of sugar and sweets in India

Sugar and sweet consumption have been popular and intrinsic to Indian culture, traditions,

Table 2: Target categories of processed food and purchase in high urban income areas (ref: 8)

Sr. No.	Food category	Products	Per capita annual purchase (kg) 2013	Per capita annual purchase (kg) 2017
1.	Sweet snacks	chocolate, honey, biscuits, cookies, jams, peanut butter, chocolate spread, rusk (excludes prepared sweets and cakes)	1.63	1.93
2.	Salty snacks:	crackers, potato chips, banana chips, other salty snacks	1.06	1.16
3.	Soft drinks (except Delhi)	carbonated drinks, juices, milk-based drinks, squashes and powdered drinks	1.29	1.11
4.	Milk	liquid milk and milk powder	16.9	16.75
5.	Dairy products	butter, ghee (clarified butter) and cheese	3	2.85
6.	Edible oils	edible oils and vanaspati (partially hydrogenated vegetable oil)	15.5	17
7.	Processed wheat	atta (wheat flour), bread, vermicelli and pasta;	79	79.75
8.	Other pro-cessed foods	Soup, ready-to-eat meal, ready-to-cook mix, frozen food, breakfast cereals, noodles, ketchup, table sauces	1.95	1.8

Table 3: Market Share by Ultra-Processed Food Category (ref:8)

Category	Market Share %	CAGR (2016 -2021)	Per Capita consumption Kg
Sweet Biscuits	43.2	11.8	2.76
Salty Snacks	18.7	14.2	1.19
Carbonated Soft Drinks	15.3	10.4	0.98
Instant Noodles & Meals	9.8	16.7	0.63
Breakfast Cereals	6.2	13.1	0.4
Packaged Juices	4.1	12.3	0.26
Processed Meats	2.7	15.8	0.17

and religion from ancient times. An attempt to corelate the increasing sugar consumption in India, including traditional sources (jaggery and khandsari) and from sugar-sweetened beverages (SSBs) to NCDs including type 2 Diabetes mellitus was made using literature search of articles, nutritional surveys in India and worldwide as well as databases.

Despite an elaborate literature search regarding sugar intake and its relationship with obesity and T2DM, only limited data is available from India. Data obtained from sugar sales suggest an increase in sugar consumption in India, both from traditional sources and from SSBs. However scientific evidence for the link of increasing NCDs to sugar consumption is not available for India (9).

The latest survey on household consumption expenditure (previously known as household consumer expenditure survey) was conducted during the period August 2023 to July 2024 in which information was collected from each sampled household in three questionnaires, including one on Food Items. HCES 24, (10). Expenses towards consumption of food were 47% in rural households and 39.7%in urban households. Among this, maximum expenses were towards daily essential food materials such as milk and milk products, vegetables, egg, fish & meat, cereals, edible oil and fruits. Expenses on beverages & processed food was only 9.8 and 11.1% of total household expenses respectively.

A review on the trends and patterns of NCD risk factors, specifically within the Indian context has been published by amalgamating existing literature and data. The prevalence, distribution, and determinants of key risk factors such as tobacco use, unhealthy diet, physical inactivity, and air pollution was studied. The review also scrutinized the socio-demographic disparities inherent in NCD risk factors, aiming to uncover disparities across different population groups. Insights into the implications for public health policy and intervention strategies aimed at tackling the burgeoning challenge of NCDs in India was given (2).

Physical inactivity emerges as a significant risk factor for NCDs in India, with studies reporting varying prevalence rates ranging from 20.3% to 66.8%. Notably, the prevalence of physical inactivity tends to be higher among women, literate individuals, and current tobacco users.

Summary:
Diets across India have not been widely investigated, yet many believe that India may be in the midst of a “nutrition transition”. Diet is expected to vary considerably within India across North-South regions.

With the exception of national food surveys, no comprehensive and up-to-date assessments of regional Indian diets are currently available. The definition of UPF with respect to Indian processed food is essential before arriving at conclusions for decision making purpose. A comprehensive survey is required to determine associations between UPF consumption and NCDs in Indian population.

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DAIRY PROTEINS: FUNCTIONAL PROPERTIES AND APPLICATIONS

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Milk is one of the most nutritious drinks in the world. Itis not only rich in high-quality protein but also an excellent source of vitamins and minerals, such as calcium, vitamin B12, and riboflavin. Milk proteins, like animal proteins, are high-quality proteins. They have high digestibility and bioavailability. They have all nine essential amino acids with a good PDCAAS value of 1. They are widely used in the food industry because of their excellent nutrient composition and functional properties. Milk contains two types of proteins produced in the mammary glands of animals: casein and whey. (1) (2)Casein makes up 80% of the proteins, and whey 20% of animal milk. In the case of human milk, the ratio is 40% casein and 60% whey.

Casein:

Casein is also referred to as phosphoprotein because it contains 0.7–0.9% phosphorus. It consists of four units: alpha-s1, alpha-s2, beta, and kappa. alpha-s1 casein forms 40% of total casein and is highly hydrophobic. alpha-s2 casein accounts for 10% of casein. The beta-casein accounts for 35% of total casein and is hydrophobic in nature. Kappa casein is the smallest fraction of the casein. It is amphoteric and plays a significant role in milk coagulation, aided by rennet. The isoelectric point of casein is around 4.6, and beyond this point, it is amphiphilic. All casein proteins are incorporated into the casein micelle, along with a high proportion of calcium and inorganic phosphate. The alpha and beta fractions are almost insoluble in water. In contrast, the kappa fraction is readily soluble and located on the surface of casein micelles because of the presence of carbohydrate sites. This makes the entire micelle soluble, forming a colloidal solution in milk. Casein has excellent emulsifying and gelling properties.

Whey proteins:

Whey proteins are serum proteins of milk. They are termed as whey proteins

because they are byproducts from Cheese and casein production. Whey proteins are a mixture of globular proteins with various properties and functions. The main fractions are beta-lactoglobulin or alpha-lactalbumin. beta-Lactoglobulin is a major fraction comprising 50% of Whey proteins. It is globular, acid-stable and heat-labile in nature, therefore denatures after heating. It has an isoelectric point of 5.1 to 5.2. alpha-lactalbumin is the second most prevalent part of whey proteins and comprises 25% of whey proteins. It has an isoelectric point of 4.2. It is heat-stable, non-gelling, and has calcium-binding properties. It is nutritionally important as it has all the essential amino acids. Lactoferrin is a non-heme iron-binding protein found in colostrum and milk. It is a multifunctional protein that regulates iron absorption, acts as an antioxidant, anti-inflammatory, and anti-carcinogenic agent. Lactoferrin protects breastfed infants from infections and inflammation. Bovine serum albumin is a water-soluble protein with an isoelectric point of 4.7. It forms 5 to 10% of whey proteins. It is a globular transport protein (non-glycosylated) found in the serum that plays a key role in the circulatory system and in various other functions. It has cholesterol-lowering and other bioactive properties, having physiological and pharmacological effects.

Functional properties of casein:

Solubility: Solubility is a significant property of casein. It is highly soluble at pH levels higher than 5.5 and lower than 3.5. Sodium and Ammonium exhibit higher solubility than calcium caseinate because of their high rate of ionisation. Enzymatic hydrolysis enhances the solubility of casein. This is because of the formation of charged groups of smaller-sized molecules of the peptides.

Moisture binding capacity: The micellar matrix structure of casein facilitates entrapment of the large amounts of water, and it has a water binding capacity of 2-4g of water per g protein. Enzymatic hydrolysis improves the water-binding capacity of casein.

Gelation: Gelation (or coagulation) occurs when milk is subjected to limited proteolysis by acidification or renneting. Rennet converts kappa-casein to para-kappa-casein in the presence of calcium ions in the milk to coagulate it. Generally, micelles in the milk are stable and aggregate only if they are heated above 100 deg C.

Viscosity: Casein solutions have a high viscosity because casein molecules have a random and open structure. The viscosity increases logarithmically with the concentration of the protein. Viscosity is maximum at neutral pH. The addition of cations affects the viscosity of the casein solution. The addition of calcium ions at pH 5.5 caused a reduction in viscosity. Treatment with proteases also reduces the viscosity.

Emulsion properties: Emulsifying power is the ability to stabilise water-oil or oil-water emulsions with minimum concentration under specified conditions. The presence of several hydrophobic sites in the peptide chain leads to bond formation between the protein and oil. Casein acts as an excellent emulsifier and forms hydrophobic interactions with lipids. Partial hydrolysis of casein improves emulsion stability. The emulsion capacity is lowest at the isoelectric pH and increases with pH.

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Foaming properties:

Foaming is associated with the surface activity of casein at the air/aqueous interface, where the surface tension decreases. It depends upon several factors such as protein concentration, temperature, ionic strength, pH, etc. It is maximum at a pH around 9.

Functional properties of whey proteins:

Solubility: Water solubility is an important property of whey proteins,which is over a wide range of pH 2 – 9. This characteristic feature of whey proteins makes them versatile in numerous beverage applications. Maintaining the solubility of whey proteins in heat processing is challenging.

Water-holding capacity:

Chemical and physical interactions between whey proteins and water occur, forming a 3D network that absorbs and retains water. The mixture can hold, bind, and entrap water. Whey proteins have an excellent water-holding capacity.

Emulsifying properties:

Whey proteins exhibit excellent emulsifying properties. Because of the amphiphilic nature, they act as natural emulsifiers by adsorbing at oil-water interfaces to reduce and stabilise emulsions. The emulsifying capacity depends on various factors such as pH, temperature, salt, and processing conditions.

Gelation property:

Whey proteins can produce gels with a wide range of characteristics, including smooth, soft curds, rigid, rubbery, and viscous gels. Mild heating of Whey Proteins can result in specific protein-protein interactions, resulting in gel formation, whereas severe thermal processing can result in coagulation or curd-like gel formation. Water is entrapped during gelation, forming a structural network.

Applications of casein in food products:

Traditionally, casein is produced by acid precipitation, by adding mineral acid or by the addition of enzymes like rennet to the milk. Casein is solubilised by the addition of calcium, sodium, potassium, or magnesium hydroxide by adjusting the pH to 6.7. They are called caseinates. Iron and copper caseinates are prepared for use in infant and dietary products. Casein hydrolysates produced by different methods have unique physiological and functional properties. Calcium and sodium caseinates also exhibit functional properties. These functional properties make casein, caseinates, and hydrolysates widely used in producing a variety of food products. The ability of sodium caseinate to improve the texture and stability of food products is used in the manufacturing of processed foods. The following table gives the applications of casein and its derivatives in some of the food products. (3)

Application of whey proteins in food products:

Whey proteins, which are byproducts of Cheese and Casein manufacturing, find applications in food and health products because of their functional and nutritional values. Different whey-based products are derived from whey liquids using biotechnological and physicochemical techniques. They are whey powder, demineralised whey powder, whey protein concentrates, whey protein isolates, etc. Ultrafiltration, reverse osmosis, and diafiltration are used to get whey powder and whey protein concentrate.

Fig 1: Food Applications of Casein

Food category	Casein product	Use level	Function
Baked products	Casein, caseinates	1-25 %	Nutrition, water binding
Cheese products	Casein, caseinates	2 -25 %	Fat and water binding, texture matrix formation
Coffee whitener	Sodium caseinate	1-10%	Fat emulsification
Confectionary	Caseinates	1-25%	Texture
Cultured products	Sodium caseinate	2-3%	Fat emulsifier, stabiliser
High-fat powders	Sodium caseinate	Upto 10%	Emulsifier
Ice cream	Sodium caseinate	1-5%	Texture, stabilizer
Infant foods	Casein or hydrolysate	1-25%	Nutrition
Instant breakfast and beverages	Sodium caseinate	2-30%	Nutrition
Meat products	Sodium caseinate	3-20%	Nutrition, Emulsifier, water binding, texture
Nutrition bars	Casein, caseinates	10-20%	Nutrition, Texture
Pasta and snacks	Casein, caseinates	5-20%	Nutrition, Texture
Pharmaceuticals	Casein, caseinates, hydrolysates	5-95%	Nutrition
Soups and gravies	Sodium caseinate	5-20%	Nutrition, thickener
Sports drinks	Sodium caseinate	2-10%	Nutrition
Whipped toppings	Sodium caseinate	5-10%	Film former, fat emulsifier, stabiliser, bodying agent

Ion exchange and gel filtration are used to get isolates. Whey protein hydrolysates are produced using enzyme hydrolysis. Due to their high protein content, whey protein concentrate and isolate are utilised in various ways in the food industry, including as nutritional ingredients and functional additives to enhance the texture, rheological, and physicochemical properties of food.

Lactoferrins: (5)

Lactoferrin is a glycoprotein with 700 amino acids and is a member of the transferrin family. It is found in human and bovine milk and has many health-benefiting properties. They include: antimicrobial, anticancer, anti-inflammatory, and probiotic effects. The iron-binding mechanism of lactoferrins plays a crucial role in the immune system. By sequestering iron, it damages cell walls and induces cell death. It stimulates the growth and diversification of specific probiotic strains, and hence has a probiotic effect. Their anti-inflammatory effect is a key factor in providing overall health preservation and nutritional support to the body. Dietary supplementation of Lactoferrin has demonstrated a significant antioxidant effect, which is linked to its ability to chelate iron ions.

Functional properties, mode of action and the application of whey proteins in the food systems are summarised in the following table. (4)

Functional properties	Mode of action	Food systems
Solubility	Protein solvent	Beverages
Water binding	Hydrogen bonding of water, entrapment of water	Meat, sausages Cakes, breads
Viscosity	Thickening, water-binding	Soups, gravies, salad dressings
Gelation	Protein matrix formation and salting	Meat, baked goods, cheeses
Emulsification	Formation and stabilisation of fat emulsions	Sausages, salad dressing, soup, cake, coffee whitener, and infant formula
Whipping/ foaming	Forms a stable film	Chiffon cakes, desserts, whipped toppings
Browning	Undergoes Maillard reaction	Bread, confections, and sauces
Flavour/ Aroma	Lactose reacts with milk protein	Baked goods, sauces, confections, soups, dairy products

Lactoferrin directly activates the immune response during bacterial infections and acts as an immunomodulator.

Because of such a wide range of health-promoting properties, Lactoferrin finds applications in dietary supplements, infant formulas, yogurt, beverages, oral, and skin care products. EFSA, in a report in 2012, suggested that the highest dose of bovine Lactoferrin studied in sub-chronic toxicity studies was 200mg/ Kg body weight per day.

Colostrum: (6)

Colostrum is the first milk secreted at the time of parturition. This is rich in lactalbumin, all the other milk proteins, and antibodies that confer passive immunity to newborns. It is also rich in micronutrients like vitamins and minerals. Bovine colostrum is similar to human colostrum in composition and rich in macronutrients such as proteins, carbohydrates, fats and micronutrients like vitamins, minerals, growth factors, antimicrobial compounds, and immune regulatory compounds. Of late, there has been an increased use of bovine colostrum in dietary supplements. The supplements are available in powder and capsule forms. IGF-1 is a naturally occurring growth hormone found in good quantity in bovine Colostrum. IGF-1 induces protein synthesis that leads to an increase in lean muscle mass without a corresponding rise in adipose tissue. It reduces protein breakdown that occurs after vigorous exercise. Colostrum contains immune factors that can regulate the immune response, growth factors to help repair damaged cells and anti-inflammatory substances to reduce inflammation.

Colostrum prevents adhesion of H pylori to lipid-binding sites of the GI tract and hence prevents peptic ulcer recurrence.

Colostrum provides immune support for muscle recovery. There are ethical issues in using newborn calf nutrition sources for human wellness. It is important to maintain the hygiene and quality where herds of cows are kept under close supervision and good hygiene without the use of antibiotics and pesticides.

Dairy proteins and precision fermentation:

(7)

Food crisis and sustainability are significant concerns, prompting scientists to explore innovative methods of food production. Precision fermentation is one such approach used to produce various food ingredients. Microorganisms with specific insertions are employed to produce these ingredients on a large scale. This technique is also utilised to manufacture high-quality ingredients like Lactoferrins and whey proteins. The US company Perfect Day has developed whey protein (β-lactoglobulin) using genetically modified fungi. As per studies by the company, this method of producing whey proteins will reduce water consumption by 96 - 99%, energy demand by 29 – 60%, and greenhouse gas emissions by up to 97% as compared to conventional whey. Bovine Lactoferrin is produced by use of fungi. The Singapore company obtained self-GRAS status for this ingredient in 2023 and planned to launch it US market.

Conclusion:

Dairy proteins are essential ingredients in developing food products and dietary supplements because of their excellent nutritional profile and functional properties. Bioactive compounds in milk are becoming increasingly important due to their physiological roles and are key ingredients for nutraceuticals and infant formulas. There is a growing trend towards veganism driven by environmental and sustainability concerns, leading to a decrease in the use of animal products. Nevertheless, this source of animal proteins will continue to be a valuable resource for food scientists to create many innovative products.

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SYNTHETIC COLOURS IN FOCUS: PERFORMANCE AND CONSUMER SAFETY

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We often "eat with our eyes first," as the visual appeal of food strongly influences our choices. Colour signals freshness, ripeness, and quality, shaping our expectations of taste even before the first bite. Bright, familiar colours make food look more appealing and enjoyable, while dull colours can reduce appetite. Overall, food colour plays a key role in attracting consumers and influencing flavour perception and eating behaviour.

Raw foods have a natural colour that reflects their quality and characteristics, but during processing, preservation, and storage, this colour may be lost or altered, leading to reduced acceptability. Since colour strongly influences consumer perception, food manufacturers add colours to restore or enhance the expected appearance of foods, especially products like jams, jellies, and beverages, where natural pigments are sensitive to heat, light, and pH.

In 2022, the Indian synthetic food colours market was valued at about USD 26.61 million. It is projected to grow to around USD 70.74 million by 2030, expanding at a compound annual growth rate (CAGR) of about 6.3% between 2023 and 2030. Growth in processed foods, confectionery, beverages, snacks, dairy products, and bakery items is driving increased use of synthetic food colours, as manufacturers focus on visual appeal and consistency (1).

Functionality

There are many functions of synthetic colours in the food processing industries.

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#Complan New Royale Chocolate contains 18 g Protein/ 100 g, while the leading malt-based food drink for children has 11 g Protein/100 g. This means that Complan has 63 % more protein. (Complan New Royale Chocolate - pack January 2025, and malt-based food drink - pack January 2025). In one serving (33 g) of Complan contains 5.94 g protein, whereas one serving (27 g) of the malt-based food drink contains 2.97 g of protein. Recommended Two serve per day. *Refers to the outcome of clinical study published in Ind. J. Nutr. Dietet; (2008). Refer pack for more details. 1.1.2 Dairy Based Beverage Mix (Proprietary Food).

The primary role of synthetic food colours lies in enhancing a product's visual appeal and supporting its commercial value. Synthetic colours make foods more attractive and appetising, restore colour lost during processing or storage, and ensure consistent appearance. They also help establish product identity by linking specific colours to flavours or product types, and are widely used to create visually appealing foods such as candies, icings, snacks, beverages, etc. Synthetic colours are widely used because they are cheaper, readily available, and suitable for large-scale manufacturing. Unlike natural colours, which are sensitive to heat, light, and pH, synthetic colours are highly stable and retain their appearance during processing and storage. They provide intense, consistent, and vibrant hues with a longer shelf life. Additionally, they are versatile and available in multiple forms such as powders, liquids, and granules (2).

These synthetic dyes can be classified based on solubility(water/oil),form or chemical structure.
Water-soluble synthetic food colours easily dissolve in water-based products, providing a clear and uniform colour ideal for beverages, syrups, jellies, etc. They offer high colour strength, easy dispersion, and consistent shades, making them efficient for large-scale production. In beverages, these colours ensure vibrant appearance and batch consistency, crucial for brand recognition, and they maintain stability under various conditions, especially in pasteurized drinks or transparent packaging. However, they are less effective in fat-rich or low-moisture items due to potential bleeding or migration.

Lake colours are produced by combining water-soluble dyes with metallic salts, like aluminium hydroxide, resulting in a form that disperses in oils and fats rather than dissolving in water. This makes them ideal for products such as chocolates, sugar coatings, and baked goods, where moisture resistance and colour stability are crucial. Lakes resist bleeding and colour migration, offer a wider range of shades, and have excellent heat stability for high-temperature processing. While they typically have lower colour strength than water-soluble dyes, they provide enhanced control over colour migration and greater creative flexibility.

Azo Dyes

Azo dyes contain the characteristic –N=N– (azo) linkage and form the largest group of dyes used in the industry. The popularity of azo dyes is based on their chemical versatility, resulting in an abundance of vibrant colours. In addition, they are low-cost, readily accessible, stable, consistent, and have no off-tastes or unpleasant odours (4).

Tartrazine (INS 102) – Yellow

Tartrazine is a synthetic food colour that gives a lemon-yellow shade. It is highly soluble in water and is widely used in processed foods. It is typically dissolved in water or applied as a powder to deliver a bright, uniform yellow colour, with excellent consistency. A key advantage of Tartrazine is its exceptional stability. It remains stable over a wide pH range (5.0–9.0) and exhibits excellent heat and light stability, allowing it to withstand cooking, baking, and prolonged exposure to light without fading. This ensures long-lasting visual appeal, even in brightly lit retail conditions.

Sunset Yellow FCF (INS 110) – Orange

Sunset Yellow FCF is a synthetic azo dye widely used as a food colourant. It is polar and highly soluble in water. Aqueous solutions are orange-yellow, becoming red-brown in alkaline solutions. It is available in granular or powder form, and its brilliant orange to orange-red hue and easy solubility allow consistent and vibrant colouring results.

Carmoisine (INS 122) – Red

Carmoisine is a red food colour known for its excellent colour retention in a wide range of food and beverage applications. Its high-water solubility ensures easy dispersion and a uniform, brilliant red to maroon shade, enhancing product appearance and consumer appeal. It may also be used to create pink shades, depending on concentration and formulation. Carmoisine is tasteless, odourless, and stable under varied processing conditions, including exposure to heat, light, and a broad pH range, without affecting flavour. For optimal results, it is typically added directly to water and stirred until fully dissolved.

Ponceau 4R (INS 124) – Red

Ponceau 4R,another azo dye,is water-soluble, allowing for uniform colour distribution in both wet and dry formulations. It provides a vivid strawberry-red hue, is odourless and taste-neutral. For best performance, it is generally added during the mixing or blending stage. The colour shows good stability to heat and light, though it may fade in the presence of ascorbic acid.

Triarylmethane Dyes

Triarylmethane dyes are known for intense blue and green shades and excellent visibility at low concentrations.

Brilliant Blue FCF (INS 133) – Blue

Brilliant Blue FCF is a synthetic colourant widely used to impart a blue colour to processed foods, medications, dietary supplements, and cosmetics. It appears as a blue powder and is soluble in water and glycerol. It is one of the oldest FDA-approved colour additives. Like other colour additives, its primary function is to enhance natural colour or to impart colour to otherwise colourless products. Brilliant Blue FCF can be blended with Tartrazine to produce various green shades.

Fast Green FCF (INS 143) – Green

Fast Green FCF is another triarylmethane food dye that imparts a sea green to turquoise shade. It appears as a red to brown-violet powder or granules and is readily soluble in water-based systems. It is valued for its good colour stability during processing and storage, ensuring a consistent and appealing appearance in finished products (5).

Some of the other dyes that belong to other classes include Indigo Carmine and Erythrosine.

Indigo Carmine (INS 132) – Blue

Indigo carmine is an organic salt derived from indigo. This blue dye is widely used in the food industry. It is valued for its intense blue shade and versatility across both food and non-food applications. Indigo Carmine is typically supplied in powder or granular form, allowing for easy and uniform incorporation into formulations (6).

Erythrosine (INS 127) – Red

Erythrosine is a synthetic red food colour. It imparts a bright cherry-pink to red shade and is supplied as a water-soluble dye, allowing for uniform colour distribution in food products.

It is used in food applications requiring vivid red or pink hues, especially in confectionery and decorative products. The dye shows consistent colour at low usage levels. It is generally stable under normal food processing conditions, though it is sensitive to prolonged light exposure, which can lead to colour fading in transparent packaging. For best results, erythrosine is usually added during the mixing or dissolving stage to ensure uniform colour development (7).

Common Colour Problems and their solutions

In large-scale food and beverage manufacturing, maintaining consistent and vibrant colour can be challenging due to factors like heat, pH changes, light exposure, poor mixing, and ingredient incompatibilities. One common issue is colour fading or dulling, caused by high temperatures or light; this can be mitigated by using heat-stable synthetic colours, adding colour later in the process, and using light-protective packaging while storing products in cool, dry conditions.

Uneven colour distribution often results from inadequate mixing and can be solved by premixing colours properly and using high-speed mixers or homogenizers for even dispersion. Unexpected colour shifts due to pH variations can be prevented by controlling pH levels and choosing appropriate, pH-stable colours. Colour precipitation or sedimentation occurs when dyes don't dissolve fully; dissolving colours completely and using emulsifiers or stabilizers help avoid this. Undesirable interactions with other ingredients require compatibility testing before full production, as they will result in unwanted colours. Colour variation between batches stems from inconsistent raw materials or dosing, and can be controlled through strict batch records, precise dosing, and using measurement tools like spectrophotometers to ensure uniformity. Finally, long-term colour stability issues during storage can be reduced by cool, dark storage, airtight packaging, and selecting colours with proven stability. Sourcing good-quality colour can further support consistency and compliance.

Consumer safety & Regulatory aspects

The safety of synthetic food colours has been extensively evaluated through toxicological studies, dietary exposure assessments, and long-term risk evaluations conducted by national and international regulatory authorities. Synthetic colours permitted for use in foods undergo rigorous pre-market approval and are evaluated by expert bodies such as the Joint FAO/WHO Expert Committee on Food Additives (JECFA), the European Food Safety Authority (EFSA), and national regulators, including the Food Safety and Standards Authority of India (FSSAI). These evaluations establish an Acceptable Daily Intake (ADI) for each colour, defined as the amount that can be consumed daily over a lifetime without appreciable health risk. When used within prescribed limits, approved synthetic colours are considered safe for the general population. While certain colours have usage restrictions or bans in specific regions based on evolving scientific evidence or precautionary regulatory approaches, such decisions reflect regulatory risk management rather than inherent toxicity at approved levels. Overall, current scientific consensus supports that synthetic food colours, when manufactured to food-grade standards and used in compliance with regulatory limits, do not pose a health concern.

Under the FSSAI food category-based regulatory framework, synthetic food colours are permitted only in specified food categories, with maximum limits varying by product type to ensure safe overall intake. Tartrazine and Sunset Yellow FCF are widely permitted in dairy-based beverages, non-alcoholic drinks, edible ices, canned fruits, jams, jellies, confectionery, bakery products, sauces, and snack foods, with maximum levels generally ranging between 100-200 mg/kg, while ready-to-eat foods are typically restricted to around 50 mg/kg.

Carmoisine and Ponceau 4R are approved for similar categories with a similar range of 100-200mg/kg, particularly in beverages, bakery wares, dairy desserts, confectionery, icings, and processed foods, where red to maroon shades are required. Brilliant Blue FCF and Indigo Carmine are permitted in dairy-based beverages, edible ices, canned fruits, jams, jellies, candies, confectionery, bakery products, sauces, and selected meat, fish, and egg products, typically at 100-200 mg/kg, but with ready-to-eat foods capped at about 50 mg/kg. Fast Green FCF is permitted mainly in canned vegetables, jellies, sauces, fish products, desserts, and dry bakery mixes, and not allowed across all categories. Erythrosine ranges from 100mg/kg in some products to as low as 50mg/kg or 30mg/kg in some categories,depending on the product. It is allowed in specific applications such as confectionery, decorative bakery products, dessert gels, icings, and speciality items like candied cherries (8).

However, some synthetic dyes may pose several health concerns, especially for the pediatric population. Some of these dyes are banned or restricted by the regulatory authorities around the world. Titanium dioxide was delisted for food use in the European Union after EFSA concluded that genotoxicity concerns could not be ruled out, particularly due to nanoparticle exposure. While still permitted in some countries, it is banned in the EU as a precautionary measure. Erythrosine was revoked for food use by the U.S. FDA following thyroid tumours observed in male rats at high doses; however, these effects are linked to a rat-specific hormonal mechanism and occur at exposure levels far exceeding typical human intake, with no consistent evidence of similar effects in humans.Fast Green FCF is not authorised for food use in the EU, possibly due to insufficient safety data.

Synthetic food colours have been associated with a range of potential adverse effects, particularly in children. Research suggests links between certain synthetic dyes and hyperactivity, attention-related issues, and other neurobehavioral changes, including in children with ADHD and Autism Spectrum Disorder (ASD). Allergic reactions, as well as cytotoxic effects and possible organ toxicity (liver and kidneys) with long-term or high exposure, have also been reported. Some dyes have raised genotoxic and carcinogenic concerns, prompting scientists to question their continued use even when regulatory limits are met. Studies indicate that these effects are not limited to children with pre-existing behavioural conditions; cognitive, behavioural, and nutritional development may also be affected in otherwise healthy children. Collectively, this evidence highlights the need for improved public awareness, stricter safety evaluations, and more precautionary regulatory approaches, particularly for products frequently consumed by children.

Natural vs Synthetic Colours

Natural colours are generally considered safe and may even have some health benefits because they are obtained from natural sources like plants, animals, various fruits, vegetables, etc. and have antioxidants and anti-inflammatory properties. But they are often limited by seasonal availability and cannot always provide the vibrancy, uniformity, and durability required in modern food products. They are very costly and cannot withstand heat, light or varying pH conditions during processing and storage. They could be prone to colour degradation over time when exposed to light and heat.

On the other hand, synthetic colours have more practical advantages than natural ones, and their use has increased significantly worldwide. Synthetic colours are relatively inexpensive, easily available for large-scale production, and exhibit excellent stability against heat, light, and pH changes, resulting in a longer shelf life compared to natural colours. They impart bright, intense, and uniform hues, ensuring consistent product appearance across batches. These colours are commonly added to foods to enhance visual appeal, make products appear fresh and attractive, compensate for colour losses during processing and storage, mask natural colour variations, and provide identity to otherwise colourless foods. Such consistency in colouring helps maintain product uniformity, strengthens brand recognition, and builds consumer trust (3).

Conclusion

Synthetic food colours continue to play an important role in modern food processing by delivering consistent, stable, and visually appealing products that meet both consumer expectations and industrial requirements. Their chemical stability, cost-effectiveness, and versatility make them particularly valuable in large-scale manufacturing, where uniformity and shelf-life are critical. While consumer concerns around food additives persist, scientific evaluation and strict regulations ensure that approved synthetic colours, when used within prescribed limits, remain safe for consumption.

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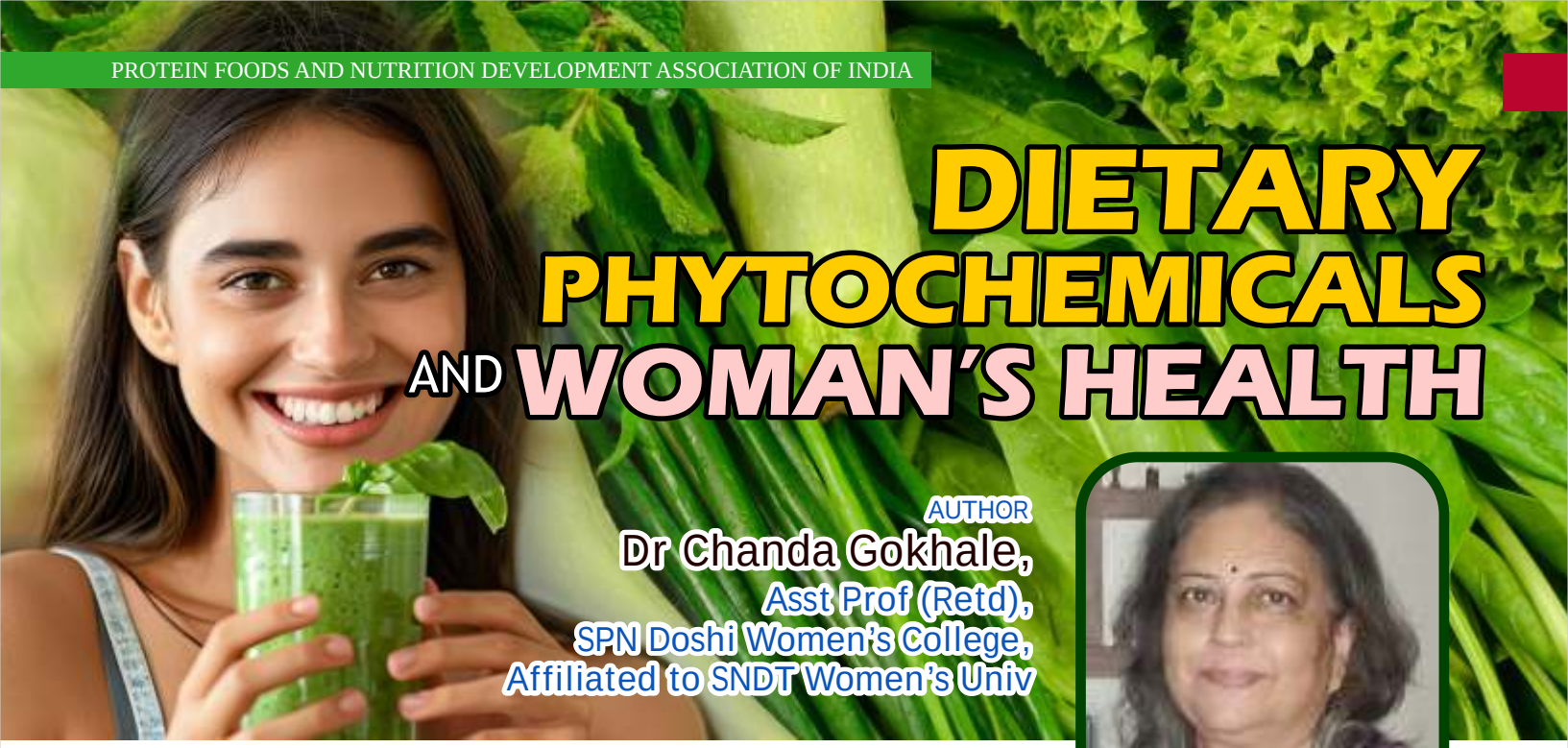

DIETARY PHYTOCHEMICALS AND WOMAN'S HEALTH

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The present article is an overview of dietary phytochemicals that have been beneficial for maintaining woman's health and alleviating health problems of women in various life stages.

Phytochemicals are a variety of chemicals produced during the growth and metabolism of plants. Majority of these compounds do not directly participate in the growth, development, and reproduction of plants and were hence named "secondary metabolites" in 1891. It is now recognized that phytochemicals present in plant foods have beneficial effects on human health. Their biological effects, ranging from antioxidant and anti-inflammatory properties to the modulation of cellular signalling pathways, suggest their potential in the prevention and management of various chronic diseases such as cardiovascular diseases, cancer, and neurodegenerative disorders. (Yang and Ling, 2025).

After intake, 90% to 95% of phytochemicals reach the colon, the benefits of phytochemicals are mediated by gut microbiota (Yang and Ling, 2025).The gut microbiota is an essential degrader and enhances the bioactivity and bioavailability of many phytochemicals such as ellagitannin, curcumin, baicalin, and quercetin. Phytochemical metabolites have an impact on cellular signalling pathways and the secondary bile acid synthesis pathway showing therapeutic activities in wide range of chronic diseases. Besides, phytochemicals have been reported to enrich the beneficial microflora (i.e., butyrate-producing bacteria) that produce metabolites, playing a role as disease-ameliorating signalling molecules or enzymes. (Kwon et al, 2023).

Only few studies have reported on the effect of specific phytochemicals on women.In adolescent girls. Highest intake of dietary flavonoids (from cocoa-based products) and, phenolic acids and resveratrol. showed favourable effect on cardiometabolic parameters like waist circumference, blood glucose, and lipid profile. Flavonoids inhibit adipocyte differentiation. Besides, flavonoids increase energy expenditure by increasing fatty acid oxidation, and thermogenesis.

They also reduce fatty acid synthesis; Phenolic acid suppress lipid accumulation and regulate the mRNA expression of adipogenic transcription factors, both mechanisms being associated with obesity. Phenolic acids can also regulate metabolic secretion of hormones, including insulin, and proinflammatory proteins, which are involved in glucose and lipid metabolism. (Emily et al 2024).

In women of reproductive age, oxidative stress constitutes a critical pathological axis linking environmental exposures, metabolic imbalance, and reproductive disorders. Dietary phytochemicals have a regulating effect on oxidative imbalance in the reproductive system, exert anti-inflammatory effects, improve insulin sensitivity and mitochondrial protection, thus offering therapeutic potential against reproductive disorders. (Liu et al, 2025).

During pregnancy, there is an increase in oxidative stress resulting from placental development, which, under normal conditions, is attenuated by the physiological antioxidant response. (Sebastiani et al, 2022) Antioxidant polyphenols increase plasma antioxidant capacity and may improve oxidative stress parameters at the fetoplacental unit, which are recognized as main issues in different pregnancy pathologies. (Nacka-Aleksic et al, 2022).

Specific dietary phytochemicals have been beneficial in pregnancy related complications like Preeclampsia (PE) and Gestational Diabetes Mellitus (GDM) in humans. In a clinical trial, resveratrol (RESV) as adjuvant with anti-hypertensive drug nifedipine significantly attenuated hypertensive symptoms among PE patients. (Ding et al, 2017).No severe adverse effects, maternal or neonatal, were associated with RESV administration. The anti-inflammatory activity of RES improves placental function and pregnancy outcomes in PE. (Lin et al, 2025)
The supplementation of Trans-resveratrol, Revifast in addition to D-chiro-inositol /myoinositol, (a second messenger for insulin action) in overweight pregnant women with an elevated fasting glucose, improved glucose levels, and lipid profile. (Malvasi et al, 2017).

Menopause is one point in a continuum of life stages for women and marks the end of their reproductive years, (WHO) leading to a dramatic reduction in the concentration of estrogen in the body. Estrogens are important hormones that directly and indirectly regulate the metabolism and function of bone and skeletal muscle via estrogen receptors. Thus, the occurrence of osteoporosis and sarcopenia is closely related to menopause in women. Osteoporosis is characterized by low bone mass and degeneration of the bone microarchitecture. Sarcopenia is characterized by the gradual and widespread loss of muscle weight and a decline in muscle function.(Lu & Tian, 2023).

Epidemiological and clinical studies have demonstrated that lycopene intake (≥30 mg/day) is effective in reducing bone resorption markers in postmenopausal women. Several beneficial mechanisms have been postulated that include effect on cell signalling pathway, anti-inflammatory, regulation of cell differentiation during bone remodelling, anti-oxidant action, and enhancement of cell communication.

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However, the bioavailability of lycopene differs depending on the isomeric form. In fact, cis-isomers of lycopene are estimated to be 8.5 times more bioavailable than all-trans lycopene. Thermal processing and mixing with oil can further increase the bioavailability of cis-lycopene present in tomatoes. (Walallawita et al, 2020).

With the increase in the aging population, sarcopenia, has become one of the most important public health problems. Results of a systematic review and meta-analysis on effect of polyphenols on sarcopenia, seem to provide evidence that polyphenols have a beneficial effect particularly on muscle mass. (Medoro et al, 2024). Preclinical and emerging clinical studies have shown that specific flavonoids such as quercetin, kaempferol, rutin, and catechins can protect against muscle loss, enhance formation of new mitochondria, improve insulin sensitivity, and stimulate muscle regeneration. (Yoon et al, 2025).

Skin aging is one of the prominent signs occurring with menopause. Phytoestrogens namely, isoflavonoids (daidzein, genistein, and equol) and the stilbean (resveratrol) bind specifically to the estrogen receptor β that are abundant in dermal (the second layer) layers. Since the epidermis does not receive blood supply, treating the skin with oral nutraceutical supplementation is an approach that can be considered. (Lephart, 2025).

A scoping review has reported that in women, with lifestyle-related diseases, including overweight/obesity, non-alcoholic fatty liver disease (NAFLD), metabolic syndrome, and knee osteoarthritis. Exercise and nano-curcumin, (the main natural polyphenol in turmeric)supplementation had benefited, especially in lowering systemic inflammation, boosting antioxidant defences, improving cardiometabolic health, and easing musculoskeletal symptoms. (Cherappurath, et al, 2025).

Despite the promising benefits of dietary phytochemicals, challenges such as bioavailability, regulatory barriers, and the need for robust clinical trials persist. (Hossain et al, 2025).In recent years, more randomized controlled trials (RCTs) have been conducted to determine whether supplementary phytochemicals are effective in preserving or enhancing human health. Following this trend, RCTs with large populations are more valuable for scientific evidence. Strengthening population research combined with experimental research will accelerate the progress on the health effects and application of phytochemicals. (Yang and Ling, 2025). Besides, gender specific clinical trials are also required to identify health benefits specially for women.

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UNDERSTANDING DIETARY REFERENCE INTAKES: RDA AND EAR

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Dietary Reference Intakes (DRIs)

Dietary Reference Intakes are a set of nutrient reference values developed to guide planning and assessment of diets for healthy populations. Among these, the Recommended Dietary Allowance (RDA) is the most widely known and used benchmark for nutrient intake (1).

The ICMR-NIN defines the nutrient requirements for Indians, based on concepts related to the distribution of nutrient requirements in normal healthy individuals. The mean of nutrient requirements distribution is called the Estimated Average Requirement (EAR), and the 97.5th percentile of the requirement distribution is called the Recommended Daily Allowance (RDA).

The EAR is used to assess the nutrient adequacy of population groups, and is also used to estimate the prevalence of nutrient inadequacy, serving as the scientific foundation for deriving RDAs. However, while diet planning for populations is based on EAR, the RDA is designed primarily as goals for individual intake and is often used in nutrition labelling, dietary guidelines, and public health policies. To prevent the risk of adverse side effects associated with excessive intake of nutrients, the Tolerable Upper Limit (TUL) for some important nutrients has been established. TUL is the highest amount of a daily nutrient intake that almost everyone can safely take in without posing a risk of adverse health effects. As intake increases above the UL, the risk of adverse effects increases (2).

Process for Setting the RDA (derivation): The RDA is statistically derived from the Estimated Average Requirement (EAR). Once the EAR is established, the RDA is calculated by adding a safety margin to account for variability in individual requirements.

The RDA is then calculated from the EAR. When the standard deviation (SD) of requirements is known, the RDA is set as EAR plus two SDs (RDA = EAR + 2 SD).

If variability data are insufficient, a coefficient of variation of 10% is assumed, and the RDA is set at 1.2 times the EAR.

The RDA is intended as a target intake for healthy individuals and should not be used to assess nutrient adequacy of individuals or groups, or for planning group diets (3).

Kellogg's

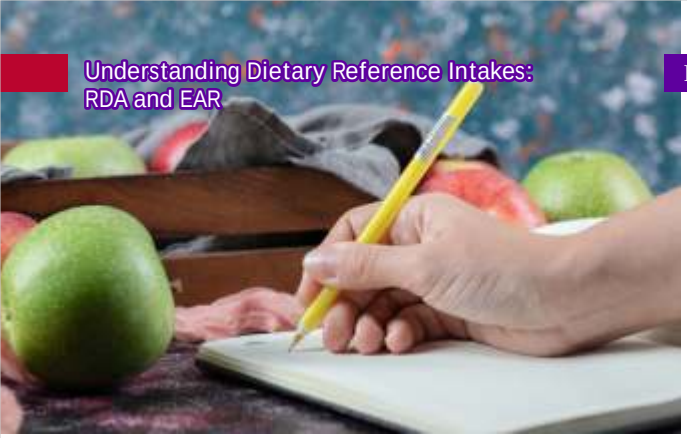
HIGH FIBRE

HIGH IRON

6 VITAMINS

ONLY 2% FAT^

Creative Visualization. Suggested Serving. ^A naturally low fat food.



Derivation of Macronutrient requirements: (4)

ENERGY:

The total energy expenditure (TEE) is calculated by the factorial approach on a multiplication of basal metabolic rate (BMR) to physical activity level (PAL): TEE = BMR X PAL.

Physical activity level (PAL):

Earlier (ICMR-NIN, 2010), the energy cost of activities was based on FAO/WHO/UNU (2004) data, which came from studies in Western populations. Indian studies show that people in India spend less energy on the same physical activities. This is likely because energy expenditure varies with body weight, and values taken from heavier individuals can overestimate energy needs for lighter individuals. Therefore, activity values were recalculated using Indian data. As a result, the physical activity ratio (PAR) for a sedentary population was reduced from 1.53 (RDA 2010) to 1.40, and lower values were also found for other activity levels. Doubly Labelled Water (DLW) and heart-rate monitoring are used to measure Total Energy Expenditure (TEE) in free-living individuals. These methods help validate or refine PAL values.

Basal Metabolic Rate (BMR):

It can be measured directly or estimated using FAO/WHO/UNU equations based on age, gender, and body weight. However, studies in India show that these equations overestimate BMR in Indians by about 10–12%. This is because the original FAO/WHO/UNU data included younger and more muscular individuals, while Indians generally have higher body fat, which leads to a lower BMR.

Earlier, the ICMR-NIN committee reduced BMR values from FAO/WHO/UNU equations by 5% when estimating energy needs for Indian adults. After reviewing newer evidence, the current committee applied an additional 5% reduction. There is no RDA for energy; the EAR for energy is equivalent to the Estimated Energy Requirement (EER). For children, there is no strong evidence that Indian children have lower BMR than Western children. Therefore, the committee retained the FAO/WHO/UNU (2004) BMR values for children.

PROTEIN:

Protein needs should meet the essential amino acid requirements. The ICMR-NIN defined protein requirements for Indians across age groups. They introduced a way to assess protein quality: the Digestible Indispensable Amino Acid Score (DIAAS), which is more accurate than the earlier PDCAAS method. In addition, the recommended cereal-legume-milk ratio in the diet was improved to 3:1:2.5.

Using average obligatory nitrogen loss, protein needs for healthy adults are set at 0.66 g/kg/day (EAR) and 0.83 g/kg/day (RDA). This value was established to prevent deficiency and maintain nitrogen equilibrium in healthy adults under minimal stress conditions. However, nitrogen balance methods have limitations, including underestimation of protein needs due to methodological constraints and failure to capture functional outcomes such as muscle mass, strength, immune function, and metabolic health.

Is EAR Being Reconsidered for Protein Recommendations?

The RDA for protein aims to meet the needs of most individuals, not define optimal intake for everyone. Specific groups, such as older adults, active individuals, and those under metabolic stress, may need significantly more protein to support muscle synthesis and healthy aging.

The Estimated Average Requirement (EAR) for adults is about 0.66 g/kg/day, representing the minimum intake for basic physiological functions. This allows for better assessment of individual protein needs rather than relying solely on the RDA, which is often misunderstood as a maximum safe intake.

This misconception can lead to insufficient protein consumption, particularly in groups that would benefit from higher intakes. Using the EAR framework highlights the importance of personalized dietary planning based on health goals and lifestyle, promoting better health outcomes through adequate protein intake (5).

FATS:

There are three main types of fatty acids in our diet: saturated fatty acids (SFA), monounsaturated fatty acids (MUFA), and polyunsaturated fatty acids (PUFA). Our body can make SFAs and MUFAs on its own, but it cannot produce certain PUFAs. These include linoleic acid (omega-6 or n-6) and alpha-linolenic acid (omega-3 or n-3), which are therefore called essential fatty acids (EFAs).

Since omega-6 and omega-3 fats cannot be made in the body, they must come from the diet. Eating adequate amounts of nuts, oilseeds, and a variety of foods helps meet these needs. For normal body functions, the recommended intake is about 6.6 g of omega-6 PUFA and 2.2 g of omega-3 PUFA per day (6).

At the same time, visible fats (such as cooking oils and butter) should be used in moderation. The recommended intake is 20–50 g per person per day (about 4–10 teaspoons), depending on calorie needs, physical activity, and physiological status. For example, in a 2000 kcal/day diet, visible fat intake should not exceed about 27 g per day. Including a mix of different oils, along with nuts and seeds, helps achieve a healthy balance of fats while supporting heart health and overall nutrition.

Micronutrients requirements:

For vitamins and minerals, EAR and RDA are set using studies in healthy individuals. These include:

1. Factorial method –

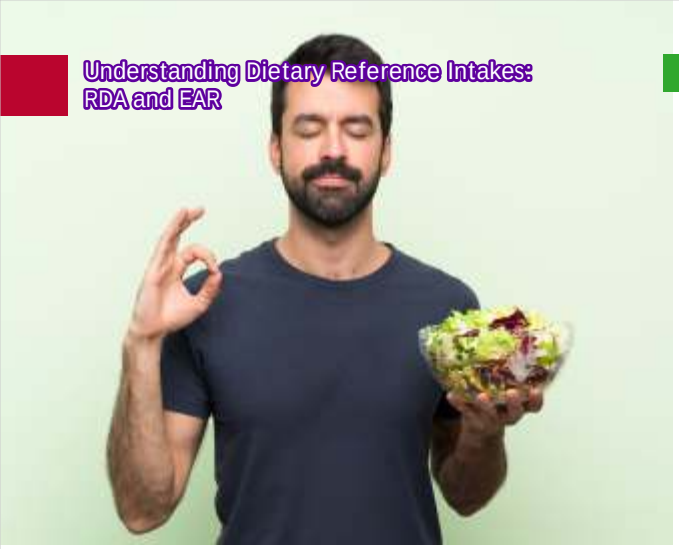
estimating losses through urine, faeces, and sweat, adjusting for absorption, and adding extra needs for growth in children or milk production in lactating women.

2. Balance studies –

determining the minimum intake needed to maintain body balance (intake equals losses).

3. Optimal function

approach – linking intake to best health outcomes, such as blood pressure (sodium) or bone density (calcium).



Researchers reviewed evidence for minerals like iron, calcium, phosphorus, zinc, selenium, and iodine, and vitamins such as B-complex vitamins and vitamin A. Data from dietary intake surveys, balance and absorption studies, loss and turnover studies, and enzyme activity studies (for vitamins B1, B2, and B6) were used. Based on this, RDA values for most vitamins and minerals are higher in ICMR-NIN 2020 compared to 2010.

However, using RDA as the reference for the whole population can shift average intakes too high, increasing the risk that some people may exceed the Tolerable Upper Intake Level. Unlike macronutrients, many micronutrients have a narrow safety range, where intakes above requirements can cause harm. Like iron (risk of overload), vitamin A (toxicity at high intakes), and iodine (thyroid dysfunction when excessive).

Recommendations differ as per life-stage:

These differences underscore why a single RDA cannot serve all individuals equally. While protein is often used as a prominent example, differences in recommendations by age and physiological state apply to all nutrients, not just protein. Nutrient requirements are determined by variations in growth, body composition, metabolic demands, hormonal status, and physiological stress across the life course.

Infants and Children: Requirements for energy, protein, essential fatty acids, calcium, iron, zinc, iodine, and several vitamins are higher per kilogram body weight to support rapid growth, organ development, and brain maturation.

Adolescents: Puberty is characterized by accelerated growth, skeletal expansion, and increased blood volume, leading to higher needs for protein, calcium, iron, zinc, and several B vitamins. These needs are highly variable.

Pregnant Women: Pregnancy increases requirements for multiple nutrients, including protein, iron, folate, iodine, choline, and energy, to support foetal growth, placental development, and maternal tissue expansion. EAR-based estimates are essential in capturing average physiological needs during this stage.

Lactating Women: Nutrient demands rise further during lactation due to the secretion of nutrients into breast milk. Protein, energy, water, calcium, iodine, and several micronutrients require upward adjustment to maintain maternal stores while ensuring adequate milk quality.

Older Adults: Aging is associated with reduced absorption, altered metabolism, and increased risk of deficiency for nutrients such as protein, vitamin B12, vitamin D, calcium, and iron. Functional outcomes such as muscle strength, bone health, immunity, and cognition become important, often requiring intakes above adult RDAs.

EAR-based estimates allow researchers and clinicians to account for these physiological transitions more realistically.

Conclusion

Dietary Reference Intakes serve distinct but complementary roles.

The RDA, derived from the EAR with an added safety margin, remains an important protective reference for individual guidance, food labelling, and public communication, particularly in populations where habitual intakes are often inadequate.

For population-level assessment, dietary planning, and evaluation of nutrient adequacy, the EAR provides a more accurate and scientifically appropriate reference.

Using both values contextually strengthens nutrition policy, improves interpretation, and supports safer, evidence-based dietary guidance.

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"TECH ENABLED NUTRITION MASTERCLASS"

COLLABORATIVE SEMINAR BY IFF Food Ingredients, PFNDAI & ITCFSAN

By
Ms Anuja Padte,
Food Scientist, PFNDAI

PFNDAI in collaboration with IFF and ITCFSAN organized on 12th November 2025, a seminar on Tech Enabled Nutrition Masterclass, a learning session on the use of technology in advancing nutrition science and product innovation. Ms Dolly Soni, Manager Marketing and Project hosted the seminar, she invited all the speakers and guest for the session and introduced them.

Ms. Vaidehi Kalzunkar, Deputy Director FSSAI West, opened the session with a warm welcome, expressing her honour to be part of the event. She introduced the work and vision of ITCFSAN (International Training Centre for Food Safety and Applied Nutrition), explaining that the centre, founded in 2019 with Global Food Safety Partnership support, aimed to be a global hub for excellence in food safety and capacity building. Ms. Kalzunkar highlighted ITCFSAN's substantial impact: over its six-year journey, it had trained more than 78,000 individuals and achieved international reach through collaborations with organizations like CODEX and the USFDA. She further detailed the facility's strengths, which included a full-fledged laboratory with two LC-MS systems for hands-on analytical training for contaminants. Finally, she noted that ITCFSAN offered both short- and long-term regulatory courses, bridging the industry-academia gap through programs like the Executive Diploma with ICT, before concluding by thanking attendees and calling for continued collaboration.

Dr. Shashank Bhalkar, Executive Director at PFNDAI, delivered the welcome address, where he emphasized the vital role proteins played in musculoskeletal health, growth, and development. He noted that while traditional plant and animal sources had sustained the global population, the continually increasing demand was placing severe stress on the environment and limited resources, contributing to greenhouse gases. This critical situation was driving food scientists to explore alternative proteins, including those from algae, insects, leaves, and biotechnology-derived cultured meat.


Dr Bhalkar thanking Mr Sathyada

Dr. Bhalkar acknowledged the substantial challenge that food developers faced in creating stable and, critically, good-tasting, high-protein products. He concluded by thanking IFF for sponsoring the masterclass and wishing the attendees a successful knowledge filled day.

Mr. Sujit Sathyadas, Group Leader Sales - Nourish ISC at IFF, delivered the opening remarks. He acknowledge d the current era of "information overload," noting that consumers were often commenting on product nutrition and health benefits across social media without necessarily having a strong scientific background. Mr. Sathyadas stressed that this media clutter was a major concern, as consumers could easily be misled. He affirmed IFF's commitment to its legacy tagline, "First We Add Knowledge," and introduced Dr. Mark Cope, who would be sharing the scientifically accepted knowledge and research that underpinned IFF's products, hoping the presentation would be highly beneficial.

Next was the Keynote Session by Dr Mark Cope, Director, Protein Solutions, Nutrition Science, IFF. He provided a multi-faceted view of soy protein, starting with its rising market prominence, particularly the 53% surge in plant-based consumption in India, positioning high-quality isolates as vital for meeting increasing nutritional demands. The core health message focuses on cardiovascular benefits, confirmed by meta-analyses showing that 25 grams of daily soy protein significantly reduces total and LDL cholesterol. Critically, soy protein is uniquely positioned to support the growing user base of GLP-1 medications by preserving muscle mass and specifically targeting abdominal fat reduction during weight loss. In sports nutrition, a breakthrough finding promotes a 25% whey, 25% soy, 50% casein blend for superior long-term results, as it extends the anabolic muscle synthesis window to two hours, outperforming whey alone. Finally, emerging research shows soy's functional benefits extend to improved skin hydration, enhanced gut microbiome diversity (beneficial for liver health), and reduced inflammation markers in chronic kidney disease, all underpinned by its strong environmental sustainability profile.

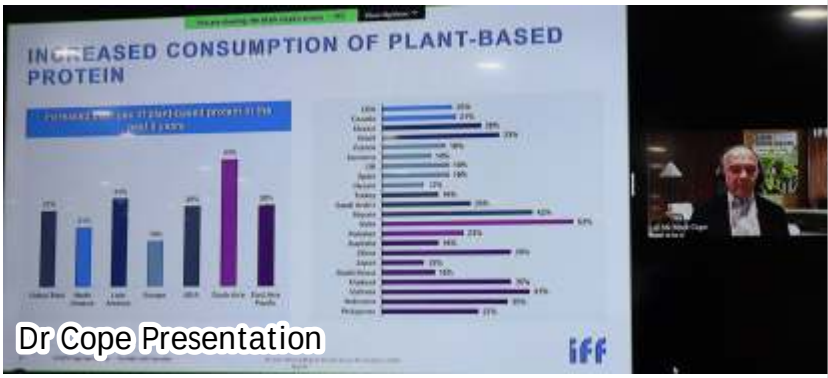
Next there was a prototype presentation session carried out by Ms Jyoti Agrawal Mittal, Senior Application Specialist, IFF Food Ingredients, focused on the company's market-driven strategy of creating superior, palatable, and shelf-stable high-protein drinks by utilizing active ingredient technology. The session presented six prototypes, including plant-based, hybrid, and dairy milk options, all offering 6-8% protein to meet the growing consumer demand for convenient and healthy food.


Mr Indranil Chatterjee thanking Dr Bhalkar


Audience & Speakers

Key technology highlights from the prototypes included ISP and the hybrid/soy drinks, and a cellulose gel stimulant for the dairy-based high-protein drink, with emphasis placed on using masking technology to ensure a desirable taste profile, especially in formulations using soy or high percentages of protein. The products were also designed to manage sweetness using a combination of sugar and stevia to reduce added sugar content.

The last speaker for the day was Ms Sheela Gauli, Food Analyst, Ex-FDA, Ex-FSSAI she presented on "Testing protocols and capabilities for designing high quality products" her presentation focused on the regulatory testing requirements for high-protein products in the market. She emphasized that protein quality hinges on its amino acid composition, digestibility, and bioavailability, which must be maintained despite challenges like heat processing, contamination, and denaturation. Testing is vital for regulatory compliance, consumer confidence, and nutritional verification. Key analytical methods discussed included HPLC/LC-MS for amino acid profiling, the accurate but tedious Kjeldahl method versus the faster DUMAS method for quantifying nitrogen (protein), and the use of NIR Spectroscopy and Gel Electrophoresis. She stressed the critical importance of safety testing (microbiological pathogen detection) and chemical testing (for contaminants like heavy metals and aflatoxins) to ensure the final product is safe and adheres to all labelling and quality standards.



Dr Cope Presentation

The session ended with Q&A with Dr Cope which was very interesting and engaging one.

Ms Soni closed the activity with a vote of thanks to the Sponsor, Speakers and guests for the session.


Dr Pai thanking Ms Kalzunkar

AUDIENCE

REGULATORY ROUND UP

AUTHOR
Dr Shashank Bhalkar,
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Dear Readers,

I wish you a happy, healthy new year 2026.

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

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 : The order dated 17th December, gives the approved list of FSSAI notified laboratories for testing fortificants (Iron, Vitamin B6, and B9) in FR, FRK, and vitamin, Vitamin-Mineral Premix for FRK. The laboratories with the validity of their accreditation should only accept the samples.

Compliance of Scheme of Testing for Packaged Drinking Water & Mineral Water : Mandatory BIS certification for packaged Drinking Water and Mineral water is omitted via FSSAI Gazette notification dated 17th October 2024. The present order describes the scheme of inspection and testing for packaged mineral and drinking water to be complied by FBO to ensure product safety.

Implementation of Standardized Format for submission of representation seeking risk assessment : Food authorities have published a format for submitting representations to the Science and Standards Division. This will enable the Scientific panels and the Scientific committee to conduct a risk assessment in alignment with FSSAI (Transaction of Business and Procedure for the Scientific Committee and Scientific Panel) Regulations 2016.

FSSAI has also requested all the stakeholders to voluntarily share the data generated through monitoring, internal assessments, or R&D relevant to Food Safety and Nutrition in the prescribed format. The data will be treated as confidential and will be used for scientific evaluation, standard-setting, and policy purposes.

The representations should be submitted through the NSC portal (https://nsc.fssai.gov.in/) effective from 1st January 2026.

Clarification regarding the use of the word "Tea": Food Authority, vide their order dated 24.12.2025, has observed that many FBOs are describing their products as or using the term “Tea” in their product description though the product is not derived or does not contain the plant Camelia sinensis like “Rooibos Tea”, “Herbal Tea”, “Flower Tea”, etc. FSS (Food Products Standards and Food additives) Regulations 2011 under 2.10.1 requires that Tea shall be exclusively from Camelia sinensis. T

he above-mentioned products do not indicate the true nature of the food contained in the package, which is against Rule 5 of FSS(L&D) Regulations, 2020. Such plant-based or herbal infusions qualify to be classified under the scope of Proprietary Foods or FSS (Approval of non-specified Food and Food ingredients) Regulations 2017. (https://fssai.gov.in/upload/advisories/2025/12/694c01c199e30Orldler%20dated%2024%20Dec%2025.pdf)

Therefore, FBOs, including E-commerce engaged in manufacturing, packing, marketing, import or sale of these products, should refrain from using the term “Tea” for any products not derived from Camelia sinensis.

Probiotic may ease gut microbiota changes linked to stress

The article reports on a randomized controlled trial conducted by KU Leuven and Danone Research & Innovation that investigated the effects of the probiotic strain Lacticaseibacillus rhamnosus CNCM I-3690 on gut microbiota stability and stress resilience in students.

Over a four-week supplementation period, participants consumed a fermented milk product containing the strain, while controls received an acidified milk placebo. The study involved 79 healthy students aged between 20 and 30, who consumed two 100 ml bottles daily, each containing 100 billion CFUs per 100 g.

The results showed that the probiotic group experienced lower changes in gut microbiota alpha-diversity compared to placebo, indicating greater stability of the microbial community under psychological stress. Specific microbial shifts were observed, including an increased abundance of Faecalibacterium prausnitzii, a butyrate-producing species with anti-inflammatory properties beneficial for colon health, and maintenance of Ruminococcus bicirculans, which has been negatively associated with major depressive disorder. The probiotic also positively covaried with butyrate producers such as Faecalibacterium and Coprococcus, as well as Bifidobacterium species (B. longum, B. bifidum), while negatively covarying with Flavonifractor.

These microbial changes were accompanied by decreased self-reported anxiety levels before exams. Earlier data from the same cohort, published in Gut Microbes in 2022, had already shown that L. rhamnosus CNCM I-3690 reduced intestinal permeability ("leaky gut") and lowered stress scores measured by the State-Trait Anxiety Inventory and Perceived Stress Scale compared to placebo.

Together, these findings suggest that the strain may help buffer the gut microbiome against stress-induced disruptions and support psychological resilience.

The study contributes to the growing evidence surrounding the microbiota-gut-brain axis, a bidirectional communication system between the gastrointestinal tract and the nervous system. Specific probiotic strains are known to produce neurotransmitters such as GABA, serotonin, and dopamine, which play roles in mood regulation and cognitive function. Consumer awareness of this axis is increasing, with surveys showing that nearly half of respondents associate probiotics with cognitive health. Market projections further highlight the relevance of this research, as psychobiotic supplements are expected to grow by 44% over the next decade, from $140 million in 2023 to $202 million in 2033.

Overall, the trial underscores the potential of targeted probiotic strains like L. rhamnosus CNCM I-3690 to modulate gut microbiota responses to stress and provide benefits for mental wellness, though the authors emphasize that further studies are needed to clarify the precise mechanisms of action.
https://www.nutraingredients.com/Article/2025/08/05/lacticaseibacillus-rhamnosus-probiotic-may-ease-gut-microbiota-changes-linked-to-stress/

The American Heart Association (AHA) has issued a scientific advisory that challenges the prevailing assumption that all ultra-processed foods (UPFs) are inherently harmful.

Published in Circulation, the advisory emphasizes that while many UPFs are linked to poor health outcomes, some can contribute positively to dietary patterns, particularly when they are nutrient-dense, affordable, and accessible.The AHA highlights examples such as whole-grain breads, low-sugar yoghurts, tomato sauces, and nut- or bean-based spreads, which have been associated with improved health outcomes.

These foods demonstrate that the level of processing alone does not determine nutritional quality. The advisory supports calls to revise the Nova classification system, which defines UPFs based on industrial formulations and additives but does not account for nutritional value.

The advisory stresses that the relationship between UPFs and health is complex. Excessive intake of saturated fats, added sugars, and salt is clearly harmful, but it remains unclear whether certain processing techniques or additives independently contribute to negative health effects. The AHA notes that some processing methods can extend shelf life, reduce costs, preserve nutrients, and enhance food safety. In certain contexts, moderate use of nutrient-dense UPFs may even support healthier dietary patterns by improving convenience, reducing domestic labour burdens, and promoting nutrition security in low-income communities.

Policy recommendations include a phased regulatory approach that distinguishes UPFs by nutritional quality rather than blanket restrictions. The focus should be on reducing high-fat, high-sugar, and high-salt UPFs while allowing select nutrient-dense options to remain part of healthy diets. Suggested strategies include front-of-pack labelling, taxation of HFSS foods, and stronger FDA oversight of food additives. The advisory also calls for more research into whether it is the extent of processing or the specific ingredients that drive health risks, as well as studies on sustainability and food security impacts.

This position aligns with growing recognition that UPFs are not a monolithic category. While two in five Americans believe all UPFs are unhealthy, the AHA and other experts argue that plant-derived and nutrient-fortified UPFs can reduce disease risk and play a constructive role in modern diets. The advisory thus advocates for a nuanced, evidence-based approach to UPF regulation and public health messaging, balancing risks with potential benefits.

www.greenqueen.com.hk/american-heart-association-ultra-processed-food-upf-nova/

Eye health: Emerging ingredients and research areas

This report highlights how eye health research is expanding beyond traditional carotenoids like lutein and zeaxanthin into newer, less conventional ingredients. Vedic Lifesciences, an India-based CRO, points to red ginseng, citicoline, and cordyceps as emerging areas of interest, alongside probiotics, saffron, sea buckthorn, krill oil, and zinc.

One of its recent collaborations with AstaReal focused on astaxanthin supplementation in school-aged children with computer vision syndrome. Over seven weeks, children receiving 4 mg of astaxanthin showed significant improvements in questionnaire scores and reduced visual fatigue compared to placebo. This study was notable enough to be shortlisted for the NutraIngredients-Asia Awards 2025 in the Infant and Child Nutrition category.
The growing interest in children's eye health is linked to increased screen time during and after COVID-19 lockdowns, which accelerated digital learning programs.

Beyond children, research is also targeting glaucoma patients. A study published in Biomedicines in May 2025 found that citicoline combined with vitamins A, B, C, E, and blackcurrant supplementation improved retinal nerve fibre layer thickness in patients with primary open-angle glaucoma. This is significant because thinning of this layer is a hallmark of glaucoma progression. Citicoline's role in supporting neuronal membrane integrity and neurotransmitter function, combined with the antioxidative effects of vitamins and blackcurrant, likely contributed to these outcomes.

For dry eye disease, red ginseng and cordyceps have shown promise. A Taiwanese pilot study in 2022 reported that cordyceps supplementation significantly increased tear film breakup time, a key diagnostic marker for dry eye.
Looking ahead, Vedic Lifesciences emphasizes the importance of exploring the eye-brain axis and how age-related cognitive decline intersects with vision. With aging populations worldwide, research into supplements that improve both eyesight and cognitive functions such as memory, focus, and alertness is seen as a critical frontier.

This evolving landscape suggests that eye health supplementation is moving

toward multi-functional approaches, combining traditional carotenoids with botanicals, probiotics, and neuro-supportive compounds to address both ocular and cognitive aspects of healthy aging.

https://www.nutraingredients.com/Article/2025/08/14/eye-health-emerging-ingredients-and-research-areas/

Why manufacturers should note rising PCOS levels

This article emphasizes why polycystic ovary syndrome (PCOS) is becoming an important area for food manufacturers to consider, both as a health issue and as a market opportunity.

PCOS affects up to 13% of women of reproductive age worldwide, with as many as 70% undiagnosed. Symptoms range from irregular periods and infertility to acne, weight gain, and increased risk of chronic conditions such as type 2 diabetes, hypertension, and heart disease. With no cure available, many consumers are turning to diet as a way to manage symptoms, creating strong demand for credible, science-backed nutritional solutions.

The piece highlights how consumer desperation has fuelled online searches and social media discussions, but also how misinformation is widespread. Influencers play a powerful role in shaping consumer choices, yet half of the most-watched PCOS-related videos on TikTok and Instagram in 2024 were found to spread false information. Experts argue that manufacturers should collaborate with credentialed health professionals and responsible influencers to ensure accurate messaging and reduce stigma.

Opportunities for industry lie in developing fortified snacks, functional beverages, supplements, and protein-rich foods tailored to women's health needs. Clear labelling, clinical trials, and education are essential to build trust and loyalty. Emerging research also points to a male equivalent of PCOS, suggesting future expansion of the market.

Nutritional guidance from institutions like Johns Hopkins and Brown emphasizes balanced diets low in sugar and processed foods, with high fibre and lean protein intake. This aligns with advocacy from groups such as the PCOS Awareness Association. Industry experts like Olivia Dawson stress that combining health benefits with flavour will be key to consumer acceptance, while Amy Davis underscores the importance of science-driven innovation.

In short, rising PCOS prevalence is not only a public health concern but also a call for manufacturers to innovate responsibly, blending scientific rigor with consumer-friendly products that address both dietary needs and social stigma.

https://www.foodnavigator-usa.com/Article/2025/08/19/why-manufacturers-should-note-rising-pcos-levels/

Boswellia effective for knee pain, stiffness — meta-analysis

The meta-analysis published in Nutrients evaluated the comparative effectiveness of seven nutritional supplements—Boswellia, curcumin, ginger, vitamin D, krill oil, eggshell membrane, and collagen—in adults with knee osteoarthritis, drawing on 39 randomized controlled trials involving 4,599 patients.

The interventions ranged from four weeks to 36 months and were assessed using WOMAC pain, stiffness, and function scores, as well as visual analog scale (VAS) pain scores.

Boswellia emerged as the most consistently effective supplement. It was the only ingredient to show statistically significant improvement in pain relief based on WOMAC pain scores, and it also ranked highest for reducing stiffness and improving function. On VAS scores, Boswellia, along with collagen, curcumin, and ginger, demonstrated statistically significant reductions in pain, with mean differences ranging from 11.89 to 17.26, which the researchers noted as clinically meaningful. Bayesian ranking methods confirmed Boswellia's superiority across all outcome measures, consistently placing it first in probability rankings for pain, stiffness, and function. Collagen, curcumin, and krill oil also performed well, particularly in improving knee function and stiffness, though their effects were less consistent and often failed to reach statistical significance compared to placebo.

Despite Boswellia's apparent superiority, the researchers cautioned that the quality of evidence remains limited. Many of the supporting studies suffer from small sample sizes, participant heterogeneity, design biases, and insufficient statistical rigor.

As a result, while Boswellia shows promise as a leading supplement for alleviating knee osteoarthritis symptoms, the findings should be interpreted carefully, and stronger, larger-scale randomized controlled trials are needed to confirm its effectiveness and reliability.

This analysis underscores Boswellia's potential role in managing knee osteoarthritis but also highlights the broader need for more robust evidence to guide clinical recommendations.

https://www.nutraingredients.com/Article/2025/08/20/boswellia-shows-superiority-in-improving-knee-pain-stiffness-in-meta-analysis/

Curcumin improves weight, waistline, BMI depending on dose, intake period

This meta-analysis, published in Nutrition & Diabetes, examined the effects of curcumin and turmeric supplementation on anthropometric measures in individuals with prediabetes and type 2 diabetes. It included 20 randomized controlled trials with 1,387 participants, using doses ranging from 80 mg/day to 2,100 mg/day over periods of eight to 36 weeks.

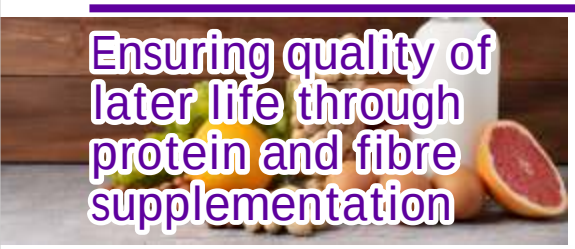
The overall findings showed that curcumin supplementation significantly reduced body weight, waist circumference, fat mass, and hip circumference, but did not produce significant changes in BMI or waist-to-hip ratio. However, subgroup analysis revealed that high-absorption curcumin taken for at least 12 weeks did lead to a significant reduction in BMI. Similarly, dosage and duration were key factors: waist circumference decreased significantly at doses above 1,500 mg/day, while body weight reduction was observed with supplementation lasting longer than 22 weeks.

The researchers noted that bioavailability plays a crucial role in curcumin's effectiveness. Strategies such as using curcuminoids in turmeric rather than pure curcumin, combining curcumin with piperine, incorporating it into nanocarriers, or pairing it with phosphatidylcholine can enhance absorption and biological activity.

In prediabetic individuals, curcumin supplementation significantly reduced body weight and waist circumference compared to placebo, though BMI changes were not significant. The study emphasized that while curcumin shows promise in improving weight-related measures, the effects on BMI are more dependent on formulation, dosage, and duration.

The authors highlighted the strengths of their work, including dose-response analysis, subgroup evaluations, and lack of publication bias, but also acknowledged heterogeneity among studies. They concluded that curcumin supplementation can improve several anthropometric indices in diabetic and prediabetic populations, with its impact on BMI being most evident when high-absorption formulations are used consistently over longer periods.

https://www.nutraingredients.com/Article/2025/08/26/curcumin-improves-weight-waistline-bmi-based-on-dose-intake-period-meta-analysis/



Ensuring quality of later life through protein and fibre supplementation

The article emphasizes the growing importance of nutrition, particularly protein and fibre supplementation, in supporting healthy ageing and maintaining quality of life as populations live longer.

Advances in healthcare have extended life expectancy, but longevity alone is not enough; the focus is shifting toward ensuring independence, resilience, and active engagement in later years. This is especially critical in Asia, where rising lifespans and declining birth rates are creating a larger proportion of older adults.

Protein and fibre are highlighted as two nutrients often lacking in older adults' diets, yet they play essential roles in mobility, immunity, digestive health, and overall wellbeing. Research shows that increased protein intake can help regulate blood glucose, stimulate insulin release, improve satiety, and support weight management.

Clinical studies on pea protein, such as Nutralys S85 Plus, demonstrate its ability to lower postprandial glycaemia and enhance muscle protein synthesis, making it a viable plant-based alternative to animal proteins. Fibre, particularly soluble fibre like Roquette's Nutriose, has been shown to improve insulin sensitivity, modulate gut microbiota, increase satiety, and reduce markers of metabolic syndrome, with short-chain fatty acids produced during fermentation contributing to anti-inflammatory and gut-strengthening effects.

Maintaining muscle mass is another central theme, as age-related sarcopenia reduces strength and mobility. Older adults require higher protein intake to overcome anabolic resistance, and studies indicate that plant proteins such as pea protein can match whey in stimulating muscle synthesis while outperforming collagen. This is particularly relevant in Asia, where protein intake is generally lower than in other regions. Fibre also contributes to physical performance, with higher intake linked to faster gait speed, better endurance, and stronger grip strength, alongside improved body composition through reduced fat mass and increased lean mass.

Ultimately, the article underscores that adequate protein and fibre intake can help older adults remain active, mobile, and independent, reducing risks of disability, hospitalization, and mortality. By addressing metabolic health, muscle maintenance, and mobility, supplementation offers a practical pathway to healthier ageing.

https://www.foodnavigator-asia.com/https://www.foodnavigator-asia.com/News/Promotional-features/protein-and-fibre-supplementation-for-healthy-ageing/

Meeting nutrition needs with innovative dairy proteins applications

The article highlights how dairy proteins, long associated with sports nutrition, are increasingly being recognized for their broader role in supporting health across different demographics.

Traditionally used in protein shakes, bars, and performance products, dairy proteins such as whey, casein, and milk protein are valued for their complete amino acid profile, high digestibility, and ability to support muscle recovery and satiety. However, their benefits extend well beyond athletes, offering nutritional support for older adults seeking to preserve muscle mass, individuals managing metabolic conditions, and the general population aiming for balanced diets.

This expanded relevance is particularly important in Southeast Asia, where rapid urbanization, rising incomes, and lifestyle changes are coinciding with higher rates of obesity, type 2 diabetes, and sarcopenia. The region faces a "triple burden" of undernutrition, overnutrition, and micronutrient deficiencies, making high-quality protein sources critical for public health. Dairy proteins consistently score highly on the Digestible Indispensable Amino Acid Score (DIAAS), underscoring their nutritional superiority compared to many alternatives. Emerging research also links dairy protein to improved glycaemic control, better weight management, and reduced blood sugar fluctuations, positioning it as a valuable tool in addressing metabolic diseases.

Consumer awareness of protein's role in nutrition is growing rapidly in Southeast Asia. Surveys conducted by the U.S. Dairy Export Council (USDEC) found that 64% of consumers understand protein's function, with younger adults showing the strongest grasp. Interest in protein-added products is high, with 76% of respondents open to trying them and many willing to pay more for protein-enriched beverages. The regional dairy market is projected to reach USD 67 billion in 2025, with annual growth of nearly 7%, reflecting strong demand for nutrient-rich, convenient options.

To meet this demand, manufacturers must innovate with products that align with local tastes and cultural preferences. USDEC has developed concepts such as reduced-sugar protein mango pudding, crunchy protein mocha bars, and longan goji berry protein snacks, all of which tested strongly with consumers in Thailand, Malaysia, Indonesia, and Singapore. These examples demonstrate how dairy proteins can be adapted into formats that resonate with regional food culture while delivering nutritional benefits.

The versatility of dairy proteins underpins this innovation. Milk proteins, composed of roughly 80% casein and 20% whey, can be processed into concentrates and isolates, while whey proteins offer high solubility and functional properties across a wide pH range. Their heat stability, water-binding capacity, and digestibility make them suitable for diverse applications, from soups and baked goods to sports beverages and ready-to-eat meals. Unlike many alternative proteins, dairy proteins require fewer processing steps, ensuring consistent safety and quality.

USDEC's U.S. Center for Dairy Excellence in Singapore plays a pivotal role in supporting manufacturers by providing technical guidance, product innovation support, and application insights. By translating scientific research into practical solutions, the center helps companies harness the nutritional and functional advantages of dairy proteins to create culturally relevant, high-protein foods and beverages that meet rising consumer demand across Asia.

Overall, the article underscores that dairy proteins are moving beyond their traditional sports nutrition niche to become a cornerstone of healthy ageing, metabolic health, and everyday dietary balance, particularly in regions facing rapid demographic and health transitions.

https://www.foodnavigator-asia.com/https://www.foodnavigator-asia.com/News/Promotional-features/usdec-insights-into-growing-dairy-protein-market-in-southeast-asia/

How to keep Ozempic /Wegovy weight loss without the nausea

New GLP-1 research reveals hidden brain circuits that could unlock safer, more effective weight-loss and addiction therapies.

Scientists are uncovering how GLP-1 drugs like Ozempic and Wegovy act on brain regions that control hunger, nausea, pleasure-based eating, and thirst. These discoveries may help create treatments that keep the benefits of weight loss while reducing unwanted side effects.

Recent research presented at Neuroscience 2025 has begun to unravel how GLP 1 drugs such as Ozempic, Wegovy, and Mounjaro act on the brain in ways that both explain their effectiveness and their side effects. These medications mimic a natural hormone that signals satiety, but they also influence circuits tied to nausea, thirst, and reward-driven eating. Scientists are now identifying specific brain regions that mediate these effects, with the goal of separating the beneficial outcomes from the uncomfortable ones.

One study showed that combining low doses of tirzepatide with oxytocin in obese rats produced nearly double the weight loss compared to either agent alone, while avoiding nausea-related behaviours. Another line of work pinpointed the area postrema, the brain's vomit centre, as the site where GLP 1 receptor activation produces both weight loss and nausea, highlighting the challenge of uncoupling these effects.

Researchers also discovered a circuit in the central amygdala that dampens dopamine activity in reward pathways, thereby reducing pleasure-driven eating and suggesting potential applications in binge eating and addiction. Finally, studies revealed that GLP 1 drugs suppress thirst as well as appetite, with the median preoptic area in the forebrain implicated in this response, raising questions about hydration balance during treatment.

Together these findings suggest that future therapies may be able to maintain the metabolic benefits of GLP 1 drugs while minimizing gastrointestinal discomfort, and they open new avenues for treating conditions that involve overlapping reward and motivation pathways.

https://www.sciencedaily.com/releases/2025/11/251118220041.htm

Vegan diet beats Mediterranean for weight loss even with potatoes and grains

Participants lost more weight on a low-fat vegan diet than on the Mediterranean diet, largely due to eliminating animal foods and reducing oils and nuts. Increased intake of plant foods, even "unhealthy" ones, was strongly associated with greater weight loss.

The Physicians Committee for Responsible Medicine has published a secondary analysis in Frontiers in Nutrition showing that a low fat vegan diet produced greater weight loss than the Mediterranean diet, even when participants consumed foods often labelled "unhealthy" such as potatoes and refined grains. The key driver was the elimination of animal products and the reduction of oils and nuts, which the plant based diet index categorizes as "healthy."

This work builds on a randomized cross over trial of 62 adults with excess weight, where each participant followed both diets for 16 weeks. The vegan plan emphasized fruits, vegetables, grains, and beans, while the Mediterranean plan included fish, low fat dairy, legumes, and olive oil. No calorie restrictions were imposed, yet the vegan diet consistently led to greater reductions in body weight, improved body composition, better insulin sensitivity, and lower cholesterol.

The secondary analysis examined dietary logs using three scoring systems within the plant based diet index. Overall plant based intake (PDI) and intake of "unhealthful" plant foods (uPDI) rose significantly in the vegan group and were linked to weight loss, while the "healthful" plant based index (hPDI) increased in both groups but showed no correlation with weight change. The findings suggest that the decisive factor was not simply eating more "healthy" plant foods, but rather removing animal products and limiting oils and nuts.

Together, these results indicate that a low fat vegan diet can outperform the Mediterranean diet for weight management, even when it includes foods traditionally considered less healthful, because the structural shift away from animal products and calorie dense oils appears to be more impactful than the distinction between "healthy" and "unhealthy" plant foods.

https://www.sciencedaily.com/releases/2025/11/251124094317.htm

The body trait that helps keep your brain young

Scientists discovered that more muscle and less hidden abdominal fat are linked to a younger biological brain age. Deep visceral fat appeared to accelerate brain aging, while muscle mass offered a protective effect.

The Radiological Society of North America has reported findings that link body composition directly to brain aging. The study shows that individuals with greater muscle mass and less visceral fat — the deep abdominal fat surrounding internal organs — tend to have brains that appear biologically younger. In contrast, higher levels of visceral fat relative to muscle were associated with accelerated brain aging, while subcutaneous fat under the skin showed no meaningful connection.

Researchers evaluated over 1,100 healthy adults using whole body MRI and artificial intelligence to measure muscle volume, visceral fat, and predicted brain age. Participants with more muscle consistently demonstrated younger looking brains, while those with more hidden belly fat relative to muscle had older looking brains. This reinforces the idea that muscle mass provides a protective effect, whereas visceral fat accelerates decline.

The implications are significant. Building muscle and reducing visceral fat emerge as realistic strategies for maintaining brain health and lowering risks of neurodegenerative diseases such as Alzheimer's. The findings also highlight how physical health and brain health are closely intertwined, suggesting that biomarkers of body composition could be incorporated into future trials of metabolic interventions.

The study further connects to current debates around GLP 1 weight loss drugs like Ozempic. While these medications effectively reduce fat, they may also contribute to muscle loss. The researchers suggest that next generation therapies should focus on reducing visceral fat while preserving muscle mass, since this combination offers the greatest benefit for both body and brain aging.

This work underscores a broader principle: interventions that protect muscle while targeting harmful fat deposits may not only improve metabolic health but also slow the biological aging of the brain.

https://www.sciencedaily.com/releases/2025/11/251125112506.htm

FOOD SCIENCE & INDUSTRY NEWS

Top proteins trends in 2025: From cell cultivated to plant-based

The 2025 Alternative Protein Landscape Report from ADM paints a detailed picture of how consumer expectations and ingredient innovation are reshaping the global protein market.

Demand for high-protein diets remains strong, with between 58 and 70 percent of consumers actively seeking to increase protein intake, often aiming for 30 grams or more per serving. Beyond quantity, however, the emphasis is shifting toward smarter, cleaner, and more diverse protein sources that balance health, sustainability, and taste.

Three distinct consumer groups are driving this transformation. Flexitarians, who make up nearly half of the global population, continue to consume meat and dairy but lean toward plant-based options, with most believing that variety in protein sources is healthier. Vegetarians and vegans, though smaller in number, exert outsized influence on trends in alternative proteins. Meanwhile, “carefree” consumers, who are not actively changing their diets, still recognize the health benefits of plant proteins and often prefer mixing multiple protein types.

Legacy proteins such as soy remain central, especially among Millennials and Gen Z, who associate it with muscle support, fat reduction, and active lifestyles. Chickpeas and lentils are also gaining traction, though lentils face an awareness-to-consumption gap. At the same time, next-generation solutions like fermentation-derived proteins are emerging as sustainable, high-quality options, with strong openness among younger demographics. Hybrid proteins that blend plant, animal, and fermentation sources are proving particularly appealing across all age groups, from Boomers to Gen Z.

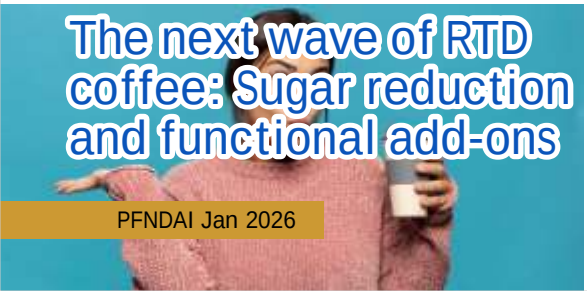
The rise of GLP 1 weight-loss drugs is accelerating these shifts. Users of these medications are closely monitoring protein intake, with many increasing consumption of plant proteins and fibre. This trend is reinforcing demand for functional foods that deliver both nutritional and health benefits.

For developers, ADM emphasizes that success lies in combining innovation with familiarity. Blending trusted proteins such as soy and chickpeas with novel fermentation-based ingredients can satisfy consumer desires for both reliability and excitement. Transparency, clean-label claims, local sourcing, and certifications will be essential to building trust. Taste and texture remain critical, especially for mainstream adoption, and culinary creativity will be key to winning over “carefree” eaters.

The report also highlights opportunities in versatile formats, including hybrid meats, dairy-style alternatives, and private-label products, which are increasingly seen as equal in quality to premium brands. Health positioning is crucial, particularly around themes of healthy aging, muscle maintenance, and weight management, which align with the priorities of GLP 1 users.

Ultimately, consumers want more protein, but on their own terms. Brands that can deliver affordability, health benefits, and strong sensory appeal through technologies like fermentation and hybrid blends are best positioned to lead the next wave of growth in the alternative protein market.

https://www.foodnavigator-usa.com/Article/2025/08/11/top-proteins-trends-in-2025/



The next wave of RTD coffee: Sugar reduction and functional add-ons

This article explores how the booming ready-to-drink (RTD) coffee sector is evolving to meet consumer demands for healthier, more functional products.

While RTD coffee has become especially popular among Gen Z for its indulgent, Instagram-ready appeal, many products are laden with sugar and fat—sometimes exceeding

recommended sugar intake or even surpassing soda levels. This has raised questions about the category's long-term credibility as a "healthier" alternative.

Brands like Hunt and Brew are positioning themselves differently by offering milk-based RTD coffees with no added sugar, relying only on naturally occurring lactose. Their approach highlights a growing divide between indulgent, dessert-like RTD coffees and those aiming to balance taste with wellness.

Industry players are increasingly turning to a "sugar reduction toolkit." Advances in natural sweeteners such as stevia, allulose, and monk fruit, alongside plant-based creamers like oat, coconut, and nut milks, are enabling manufacturers to deliver sweetness and texture without excess calories or fat. Yet, as beverage developer Imbibe points out, indulgence and health are not mutually exclusive—consumers define "luxury" differently, whether through rich flavours or convenience and portion control.

Several brands are already leading this shift. Super Coffee offers protein-rich, low-sugar options; La Colombe incorporates chicory root fibre; Califia Farms provides dairy-free, low-calorie alternatives; and Pop & Bottle experiments with adaptogens like lion's mane. These examples show how RTD coffee is being reframed as a functional beverage category.

The next wave of RTD innovation is expected to go beyond sugar reduction into functional add-ons. Protein, adaptogens, nootropics, electrolytes, and other bioactive ingredients are being incorporated to enhance energy, focus, hydration, and overall wellness. Companies like Unconform in the UK and Throne Sport Coffee are already experimenting with these concepts.

As Westrock Coffee notes, RTD formats are ideal for functional innovation because they allow precise control over nutrient levels and stability. This positions RTD coffee as not just a convenient indulgence but also a platform for health-focused, customizable experiences.
The category is now at a turning point: moving from "dessert in a bottle" toward products that balance indulgence with health, leveraging sugar reduction strategies and functional ingredients to align with evolving consumer expectations.

https://www.foodnavigator-usa.com/Article/2025/08/12/sugar-reduction-in-rtd-coffee-key-ingredients-for-success/

Personalized marketing: AI-powered identity resolution blends deterministic and probabilistic matching

This piece outlines how Hightouch is reshaping identity resolution for marketers by blending deterministic and probabilistic approaches with AI.

Traditionally, companies had to choose between deterministic resolution, which is highly accurate but limited to exact matches like identical email addresses or phone numbers, and probabilistic resolution, which uses informed guesses to connect mismatched identifiers but sacrifices precision. Hightouch's new service allows marketers to "toggle" between these modes depending on their goals, offering flexibility to prioritize either accuracy or reach.

The innovation is significant because it operates directly within a company's own data warehouse rather than in a separate customer data platform or "black box." This means businesses retain ownership and control of their data while benefiting from AI-powered matching. For consumer packaged goods companies, this enables a holistic view of customers across multiple touchpoints—retailers, direct-to-consumer platforms, and social media—without outsourcing sensitive information.

The platform also represents a shift away from older marketing models where companies handed over data to platforms like Google or Meta, which then controlled targeting decisions. Instead, Hightouch's AI decisioning system allows organizations to define their goals, connect their systems and creative assets, and let the platform optimize delivery in-house.

By acknowledging that identity is situational and not absolute, Hightouch provides marketers with a dynamic tool to tailor personalization strategies.

recommended sugar intake or even surpassing soda levels. This hah evolving consumer expectations.

https://www.foodnavigator-usa.com/Article/2025/08/15/hightouch-blends-deterministic-and-probabilistic-matching-to-unlock-unified-customer-profiles/

How supplement brands are responding to neurodiverse needs

This examines how supplement brands are beginning to respond to the needs of neurodivergent consumers, while navigating complex scientific and regulatory challenges.

Awareness of neurodiversity—differences in brain function related to sensory processing, cognition, and social comfort—is growing across industries, and nutrition is increasingly recognized as playing a role in supporting associated health concerns. Although no supplement is authorized to treat or prevent conditions such as autism spectrum disorder (ASD) or attention deficit hyperactivity disorder (ADHD), nutraceuticals are being positioned to address related symptoms and clinically verified deficiencies.

Micronutrient deficiencies are common among children with autism due to selective eating habits. A recent review of 44 case studies identified frequent deficiencies in vitamins A, B12, and D, as well as calcium and iron, sometimes leading to rickets, osteopenia, or immune and vision problems. Supplementation corrected deficiencies in most cases, though many children had multiple co-occurring deficiencies. In ADHD, research suggests potential associations with deficiencies in magnesium, iron, zinc, polyunsaturated fatty acids, and vitamin D.

Individual nutrients have been studied for their impact on neurodevelopmental outcomes. Vitamin D supplementation has shown improvements in repetitive behaviours and certain autism rating scores, though results across core symptoms remain inconsistent. Melatonin has demonstrated efficacy in improving sleep onset and duration in autistic children. Coenzyme Q10 has been linked to better communication, play, and sleep, while palmitoyl-ethanolamide (PEA) has shown promise for language and behaviour in small-scale studies.

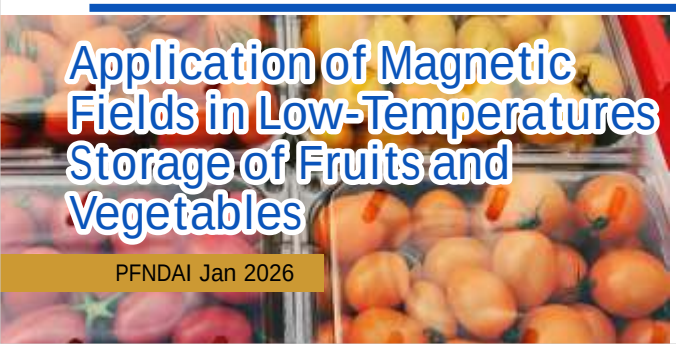
The gut-brain axis is another area of focus, with probiotics and vitamins improving gastrointestinal symptoms and behavioural scores in individuals with neurodevelopmental disorders. Building on this, Floré launched synbiotic products in 2024 specifically targeted at autistic consumers.

Formulation challenges remain significant. Neurodivergent individuals often have heightened sensitivities to taste, smell, and texture, making supplement adherence difficult. Brands are addressing this with unflavoured powders, smooth-textured softgels, and adaptations based on dysphagia frameworks. Simple Spectrum, for example, offers unflavoured multivitamin powders free from artificial colours and preservatives, designed for children with autism.

Marketing is tightly regulated. In the UK, the Advertising Standards Authority has ruled against companies making claims that supplements could treat or cure autism or ADHD, reinforcing that such claims are prohibited unless products are authorized as medicines. Currently, no supplement is approved as a treatment for these conditions in the UK or EU.

Overall, supplement brands are cautiously innovating to meet neurodiverse needs, focusing on symptom-related support, sensory-friendly formats, and scientifically grounded formulations, while navigating strict advertising and regulatory boundaries.

https://www.vitafoodsinsights.com/delivery-formats/how-supplement-brands-are-responding-to-neurodiverse-needs



Application of Magnetic Fields in Low-Temperatures Storage of Fruits and Vegetables

The nutritional value and sensory properties of fresh fruits and vegetables can be significantly affected by their short shelf life.

Freezing and cold storage technologies are superior methods to prolong the shelf life of fresh fruits and vegetables. However, traditional freezing and cold

storage methods often contribute to the loss of nutrients, compromised cellular structure, and diminished sensory attributes. Numerous studies have shown that magnetic fields (MFs) enhance supercooling, inhibit the growth of ice crystals, and reduce freezing time, thereby preserving food quality and improving cold storage efficiency, ultimately extending shelf life.

This review elucidated the operational mechanisms and impacts of MFs on refrigeration and freezing processes. Additionally, it provides a comprehensive summary of the applications and effects of various types of MFs on fruits and vegetables.

Furthermore, the mechanisms and effects of various techniques assisted MFs and influence of MFs in fruits and vegetables were summarized. Finally, the shortcomings and future development trends of MFs are discussed. This review provides valuable insights into the advancement of MFs in designing products with optimized low-temperatures storage techniques and conditions.

The article provides a comprehensive review of how magnetic fields (MFs) can be applied to improve the preservation of fresh produce under cold storage and freezing conditions. It begins by highlighting the fundamental challenge: fruits and vegetables have a short shelf life, and while freezing and refrigeration are widely used to extend it, these conventional methods often lead to nutrient loss, structural damage at the cellular level, and diminished sensory qualities such as taste and texture. The review emphasizes that magnetic fields have emerged as a promising technology to address these limitations.

The authors explain that MFs can enhance supercooling, inhibit the growth of ice crystals, and reduce freezing time. These effects are crucial because they help maintain the integrity of cellular structures, preserve nutrients, and sustain sensory attributes. The paper details the operational mechanisms by which MFs influence refrigeration and freezing processes, including their role in modifying water molecule behaviour and ice nucleation. It also surveys different types of magnetic fields and their specific applications across various fruits and vegetables, noting how they can improve cold storage efficiency and extend shelf life.

Beyond direct applications, the review discusses techniques that combine MFs with other preservation methods, showing how these hybrid approaches can further optimize outcomes. The authors also acknowledge limitations and challenges, such as variability in effectiveness depending on produce type, the need for standardized protocols, and gaps in understanding the long-term impacts of MF exposure. They conclude by outlining future development trends, suggesting that advances in MF-assisted storage could lead to more sustainable and efficient cold chain systems, ultimately benefiting both producers and consumers.

This article positions magnetic fields as a valuable innovation in food preservation, offering insights into both scientific mechanisms and practical applications, while also recognizing the need for continued research and refinement.

https://ift.onlinelibrary.wiley.com/doi/10.1111/1541-4337.70252

The announcement of EdiMembre marks a significant development in the alternative protein industry.

Established in Massachusetts as a spin-out from Merck KGaA, Darmstadt, Germany, and supported by venture builder mantro GmbH, the company is positioned to commercialize edible membrane technology that has been under development for several years. This technology is designed to enable the creation of structured cultivated meat products that replicate the texture and complexity of conventional meat, addressing pressing challenges in sustainability and global food security. The innovation also extends to plant-based applications, such as high-protein pasta, demonstrating the versatility of the platform.

Merck KGaA has contributed intellectual property, expertise, and cell culture media to

support the venture, while mantro has provided company-building expertise and investor connections. Together, they have created a foundation for EdiMembre to accelerate commercialization and scale production. The leadership team, composed of Timothy Ryan Olsen as CEO and Ryan Sylvia as CTO, brings direct experience from Merck's cultured meat and scaffold technology programs, ensuring continuity of knowledge and technical depth.

Statements from Merck's Group Science & Technology Officer Laura Matz and mantro's CEO Manfred Tropper underscore the strategic importance of this initiative. Both highlight the potential of EdiMembre to drive meaningful change in sustainable food production by combining cutting-edge science with entrepreneurial execution. The venture reflects Merck's broader commitment to fostering innovation beyond its corporate boundaries, while mantro's involvement ensures that the spin-out is grounded in market readiness and scalability.

This launch positions EdiMembre as a key player in the evolving alternative protein landscape, with the potential to influence both technological development and consumer adoption of structured cultivated meat and plant-based products.

https://www.emdgroup.com/en/news/edimembre-spin-out-08-18-2025.html

How 'swicy' became the global flavour with staying power

The article traces the rise of "swicy"—the sweet-spicy flavour combination—from a niche experiment into a mainstream global trend.

A decade ago, sweet and spicy rarely appeared together outside of chili chocolate or jalapeño jelly, but in the past five years the pairing has proliferated across categories from biscuits and chips to cookies and popcorn. The most prominent example is hot honey, which has become the breakout star with a 61% average annual growth rate in product launches over the past five years. This surge has helped drive a 9% increase in U.S. spicy food and drink sales, while globally spice-flavoured launches have grown about 5% annually since 2018.

The article highlights how major brands and regions have embraced swicy. McVitie's introduced Hot Honey Jaffa Cakes in the UK, Doritos made Sweet & Tangy BBQ permanent in North America, South Korea incorporated gochujang into snacks during the K-flavour boom, and Mexico's tamarind-chili candy has found new international audiences. Snacks have been the most dynamic category, with potato-based launches up 70% in 2024, while nuts, seeds, popcorn, and bakery items are also adopting sweet-heat combinations. Artisan bakers are experimenting with cayenne ginger cookies and mango-chili macarons, showing the trend's versatility.

Consumer demand is being driven by Gen Z and Millennials, who grew up with global street food, viral recipe hacks, and hot-sauce challenges. More than half of Gen Z actively seek swicy flavours, and two-thirds of U.S. shoppers express interest in sweet-spicy sauces. Social media amplifies the trend, with viral content such as hot honey on pizza or chamoy fruit cups fuelling awareness. The global palate also plays a role, as cuisines like Thai, Mexican, and Indian have long blended sweet and spicy, making swicy feel adventurous but accessible.

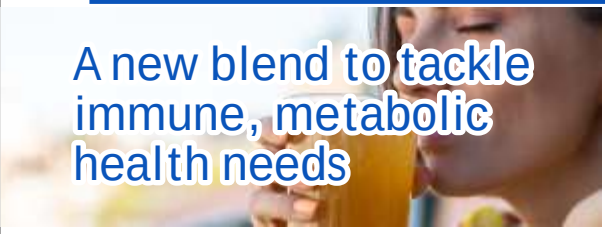
The flavour mix is broadening beyond hot honey to include chipotle, habanero, jalapeño, ghost pepper, and fruit pairings like mango-habanero, pineapple-jalapeño, peach-chili, and yuzu-chili. Complementary ingredients such as maple syrup, molasses, cinnamon, ginger, and peppercorns add depth and variety, while texture innovations enhance the sensory experience. Importantly, swicy is not seen as a passing fad. Forecasts predict U.S. menus will add 9–10% more swicy dishes in the next four years, with seasonal snack editions evolving into permanent offerings.

The article stresses that balance and authenticity are key to success. Consumers prefer medium heat with clear sweetness, and credibility is enhanced by naming specific peppers and their origins. Limited runs allow brands to test before scaling, while marketing should emphasize

the experience rather than just the flavour. Supply chain stability for chilies, honey, and tropical fruits is critical, and sustainability stories add further appeal.

Ultimately, swicy resonates because it delivers comfort and excitement simultaneously, creating memorable flavours that consumers return to. It has already reshaped the snack aisle and is steadily moving into bakery, promising strong commercial potential for brands that embrace it.

https://www.foodnavigator-asia.com/Article/2025/08/14/swicy-the-sweet-spicy-flavor-taking-over-bakery-snacks/



A new blend to tackle immune, metabolic health needs

AAK has introduced a new ingredient blend combining omega 3 DHA with phosphatidylcholine in a proprietary ratio, aimed at supporting both immune and metabolic health.

The launch took place at the Growth Asia Summit 2025 in Singapore, reflecting the company's focus on addressing Asia's growing metabolic health challenges, including obesity and diabetes.

The innovation is based on preclinical findings showing that AkoVitaOptiSyn increases DHA uptake into cell membranes by 150% compared to regular DHA oil. Since DHA's biological activity depends on its incorporation into cell membranes, this enhanced delivery is expected to improve outcomes such as reducing low grade inflammation, boosting insulin sensitivity, and inhibiting fat accumulation. Phosphatidylcholine is thought to play a key role in facilitating DHA digestion, transport, and function. The company plans further studies in mice to identify relevant biomarkers, followed by human clinical trials to validate these effects.

AAK emphasized that metabolic syndrome, often linked to obesity and chronic inflammation, is a pressing issue in Asia. National initiatives, such as China's three year weight management plan and India's call for reduced oil intake, highlight the regional urgency. By targeting inflammation, AAK suggests that AkoVitaOptiSyn could indirectly support weight management and overall wellbeing.

Beyond supplements, AAK is positioning AkoVitaOptiSyn as a differentiator in the functional food category. At the summit, prototypes such as an oat based chocolate drink and an enteral nutrition drink were showcased. The company cited consumer data showing strong interest in functional foods and beverages over traditional supplements, with nearly half of surveyed consumers preferring fortified foods.

AkoVitaOptiSyn sits within AAK's specialized nutrition division, which already covers infant and medical nutrition. The company sees this launch as a step toward expanding into functional foods, leveraging its expertise in dairy and lipid applications to co develop differentiated products with brand partners. This strategy aligns with consumer demand for convenient, health focused options that integrate seamlessly into daily routines.

https://www.nutraingredients.com/Article/2025/08/21/aak-launches-dha-phosphatidyl-choline-blend-to-tackle-asias-metabolic-health-needs/

What is the market potential for 'balanced proteins'?

Balanced proteins represent a strategic evolution in the food industry, offering a hybrid solution that blends animal protein with plant-based ingredients, vegetables, or mycelium.

This approach directly addresses the gap between consumer aspirations to reduce meat consumption and the reality that only a small fraction are actually doing so. By retaining familiar animal protein as the base, these products deliver on taste expectations while simultaneously reducing overall meat reliance, which makes them more appealing to mainstream consumers than purely plant-based alternatives.

Taste tests have already shown that balanced protein burgers and nuggets can outperform conventional meat in texture and flavour, and in most categories they surpass leading plant-based competitors, suggesting that they are further along the path to consumer acceptance than the plant-based market itself.

From a business perspective, balanced proteins provide resilience against supply chain volatility and environmental pressures. By diversifying ingredients, companies can mitigate risks associated with extreme weather events or price spikes in beef, while also positioning their products as premium offerings that appeal to both meat-eaters and flexitarians. This dual appeal broadens the consumer base and supports sustainability goals without alienating those who are reluctant to fully embrace plant-based diets. The category also offers a hedge against market shocks, helping stabilize pricing and ensuring continuity in production.

The challenges are not insignificant. Infrastructure limitations mean that many meat facilities lack the equipment to incorporate vegetables, while plant-based facilities face safety barriers to adding animal protein. Consumer perception is another hurdle, as past attempts failed when plant additions were dismissed as fillers rather than value-enhancing components. Success will depend on transparent communication and creative branding that emphasizes benefits such as improved nutrition, lower saturated fat, and chef-inspired flavour combinations. The limited competitive landscape is both a challenge and an opportunity, leaving few proof points but vast untapped potential for innovators willing to invest in this space.

Balanced proteins therefore stand at the intersection of taste, sustainability, and resilience. They are not positioned as a compromise but as an enhancement, reframing the narrative from “different” to “better.” If companies can overcome infrastructure barriers and craft compelling marketing that highlights their unique advantages, balanced proteins could redefine the protein category and establish themselves as a mainstream solution in the evolving food system.

https://www.foodnavigator-usa.com/Article/2025/06/18/what-is-the-market-potential-for-balanced-proteins/

Snack trends reshaping the industry

The Future of Snacking report paints a vivid picture of how the snack market is evolving, driven largely by Millennial and Gen Z consumers who crave bold flavours, healthier options, and convenience.

Here’s a structured narrative of the five major trends reshaping the $148 billion industry:

Mini Snack Flexibility

Portion control and versatility are key. Consumers increasingly prefer mini-sized snacks that can be eaten as quick bites or combined into a meal. This format is growing faster than traditional snack categories, reflecting a shift toward customizable consumption occasions.

Flavour Explosion

Adventurous flavour profiles are booming. Sriracha, garlic parmesan, hot honey, and especially pickle-inspired products are surging in popularity. Foodservice innovation, like Popeyes’ pickle-flavoured menu, is fuelling this trend. Nostalgia also plays a role, with dessert-inspired flavours such as tiramisu, cinnamon bun, and churro making snacks feel familiar yet exciting.

Snacking Without Borders

Global flavours are carving out significant market share. Teriyaki snacks alone reached $750 million in annual sales, while enchilada, ramen, and masala flavours are emerging. Formats like seaweed chips and chickpea-based snacks are growing rapidly, with chickpea snacks up 214% and seaweed up 74%. Social media virality, such as Dubai pistachio cream chocolate bars, hints at the next wave of global inspiration.

Better-for-You Snacks

Health-conscious snacking is accelerating, influenced both by younger consumers and the rise of GLP-1 drug use. Protein-rich options (meat snacks, nuts, fruit-based snacks) are leading growth. Mainstream brands are reformulating with added protein, fibre, and reduced sugar. Products making sugar-management claims saw 14% year-over-year volume growth, underscoring the demand for functional benefits.

Better Together – Co-Branding

Collaborations between snack brands and restaurants, entertainment franchises, or retail brands are thriving. Buffalo Wild Wings/Slim Jim Chicken Sticks generated $965 million in sales, while Hollywood tie-ins reached $466 million. Co-branding offers credibility and "instant crave appeal," exemplified by Snack Pack's partnership with Dove Dark Chocolate.

Snacks on the Go

Convenience is critical. Consumers increasingly eat snacks within 30 minutes of purchase, driving growth in online, gas station, and club store channels. Success depends on availability in diverse retail environments, from grocery aisles to home improvement stores, ensuring snacks meet consumers wherever they are.

https://www.foodnavigator-usa.com/Article/2025/09/02/5-snack-trends-reshaping-the-industry/

Taste Enhancement: Precision technologies enable clean label, sugar reduction and plant-based adoption

The article describes how the food and beverage industry is undergoing a transformation in taste enhancement, driven by the convergence of plant-based protein adoption, sugar reduction mandates, and clean label demands.

It emphasizes that consumers prioritize health and naturalness, with artificiality now ranking as a major barrier to purchase. To meet these expectations, companies are deploying precision technologies that go beyond traditional masking. dsm-firmenich's ModulaSense applies receptor-based molecular design to neutralize specific off-notes in plant proteins, ensuring cleaner flavour profiles and greater consumer acceptance. Sensient's BioSymphony uses biotransformation to create complex, authentic flavours by mimicking natural enzymatic processes, producing richer taste experiences and reducing the lingering bitterness of high-intensity sweeteners. HTBA's OptiTaste platform employs citrus flavonoids derived from upcycled immature fruits to enhance flavour and mouthfeel while supporting sugar reduction, aligning with sustainability and clean label principles.

The narrative highlights that taste is the gateway to consumer adoption, with sustainability only scaling when products succeed in the market. Clean label integration is presented not as a trade-off but as a foundational design principle, with natural processes and solvent-free extraction methods ensuring compliance with consumer expectations and regulatory standards. Circular economy approaches are central, with upcycled rapeseed meal and citrus fruits transformed into functional solutions that reduce waste and add commercial value. Technical challenges such as stability of flavonoids under environmental conditions and regional regulatory differences remain, but companies are designing globally applicable solutions.

Looking ahead, taste and texture are expected to become category standards in healthier formulations, with investments in receptor biology, predictive sensory science, and expanded biotransformation platforms ensuring that reduced-sugar and plant-based products deliver authentic, satisfying experiences.

https://www.foodingredientsfirst.com/news/precision-taste-technologies-clean-label.html

India urges cuts of oil, sugar in foods under anti-obesity plan

India has launched a comprehensive anti-obesity initiative under Prime Minister Narendra Modi's direction, with the Food Safety and Standards Authority of India (FSSAI) urging states to implement dietary reforms focused on reducing oil and sugar consumption.

At the 47th Central Advisory Committee meeting, the FSSAI called for coordinated action across government, schools, and the food industry, following Modi's appeal in his Mann Ki Baat radio address for a 10% reduction in oil use nationwide.

One of the most visible measures is the introduction of "sugar boards" in schools, mandated by the Central Board of Secondary Education (CBSE). These boards display sugar content in everyday foods and beverages, outline recommended daily limits, and highlight the health risks of excessive sugar intake. The initiative is intended to cultivate healthier eating habits among children from an early age. Public awareness campaigns are also being strengthened, with prominent figures such as politicians, actors, and Olympians nominated to lead efforts encouraging healthier diets.

The urgency of these measures is underscored by rising obesity rates. National Family Health Survey data show that overweight prevalence among children under five increased from 2.1% in 2015–2016 to 3.4% in 2019–2021. Among adults, 24% of women and 23% of men are overweight or obese, with 6.4% of women and 4% of men aged 15–49 classified as obese. Researchers emphasize that poor dietary habits, processed food consumption, sugary beverages, low fruit and vegetable intake, physical inactivity, excessive screen time, and inadequate sleep all contribute to a high-risk environment for obesity.

The government has identified six key drivers of obesity: high-calorie, low-nutrient diets; easy access to processed foods; a growing culture of eating out; use of genetically modified crops; sedentary lifestyles; and reduced physical activity. In response, India has adopted a multi-pronged strategy. The Ministry of Health and Family Welfare is strengthening public health responses through improved screening and awareness campaigns.

The Ministry of Ayush is promoting traditional wellness approaches such as Ayurveda, yoga, and personalized diets, with tens of thousands of patients already benefiting. The Poshan Abhiyaan programme targets childhood obesity by improving nutrition outcomes for children, adolescent girls, and mothers. The Fit India Movement encourages schools to integrate fitness into daily routines, while the Eat Right India initiative enforces mandatory front-of-pack labelling for foods high in fat, sugar, and salt, helping consumers make informed dietary choices.

Together, these measures reflect India's attempt to tackle obesity through a blend of modern public health strategies, traditional wellness practices, and regulatory reforms, aiming to reshape dietary habits and promote a healthier future.

https://www.foodnavigator-asia.com/Article/2025/08/05/fssai-backs-pm-modis-obesity-plan-with-push-to-cut-oil-and-sugar/

India enforces stricter transparency, food safety training for e-commerce

India's Food Safety and Standards Authority (FSSAI) has introduced a new set of directives aimed at tightening food safety and transparency requirements for e-commerce platforms.

These measures, described as bold but necessary, focus on strengthening hygiene practices and closing regulatory gaps that have emerged as online food retail has rapidly expanded.

The directives require all food handlers, including e-commerce staff, to undergo mandatory FoSTaC training in food safety and hygiene.

Platforms must also upload photographs of storage facilities to the Food Safety Compliance System (FoSCoS) portal and disclose full details of all warehouses linked to their operations. In addition, FSSAI license or registration numbers must be prominently displayed on receipts and invoices, and information about the Food Safety Connect App must appear on all consumer-facing documents.

FSSAI CEO Ganji Kamala V Rao emphasized that non-compliance will be treated with utmost seriousness, with penalties ranging from fines of Rs 1 lakh for unsanitary conditions to Rs 2 lakhs for failing to comply with food safety officers' directions. The enforcement is expected to push businesses to prioritize food safety, though smaller firms may struggle with documentation, digital processes, and scaling training across gig workforces.

Ashwin Bhadri of Equinox Labs noted that storage, often overlooked in the supply chain, is now recognized as a critical point for ensuring food safety. He acknowledged challenges for smaller businesses but suggested mobile-friendly, regional-language training modules as a practical solution. He also stressed that food safety is a shared responsibility across manufacturers, logistics providers, platforms, and sellers.

The new rules are also designed to enhance consumer confidence. By requiring platforms to display oversight tools like the Food Safety Connect App, FSSAI signals accountability and encourages consumers to trust online food purchases. This shift is expected to reshape competition among platforms, with safety and trust becoming key differentiators alongside speed and discounts.

The regulatory update reflects a broader recalibration of food safety frameworks, which historically focused on physical retail and restaurants. With millions of Indians now ordering meals, groceries, and supplements online, FSSAI's directive underscores that digital convenience cannot come at the expense of public health.

By mandating transparency, training, and traceability, the policy aims to bring structure and accountability to the online food ecosystem, preventing incidents like the recent Zepto scandal and aligning food safety regulation with the realities of the digital economy.

https://www.foodnavigator-asia.com/Article/2025/08/27/india-doubles-down-on-food-safety-for-e-commerce/

'Food labels go beyond marketing': India signals tighter rules ahead

India's latest consultation signals a decisive shift toward stricter oversight of food labelling and advertising, with the Food Safety and Standards Authority of India (FSSAI) positioning transparency and accountability as central to consumer protection.

Although no binding measures were announced, the coordinated messaging across ministries makes clear that companies should expect closer scrutiny of health and nutrition claims.

A major theme was the validation of claims. Sanjeev Sanyal of the Economic Advisory Council emphasized that even scientifically backed claims require external verification, hinting at the possibility of mandatory third party validation in the future. This reflects growing concern that misleading or exaggerated claims undermine consumer trust and pose public health risks.

At the same time, regulators are working to reduce uncertainty for industry. FSSAI's move to implement all labelling changes annually on July 1 provides manufacturers with a predictable compliance calendar. Complementing this, new labelling requirements and a digital platform for reporting misleading claims reinforce transparency and consumer empowerment.

Speakers from the Department of Consumer Affairs, the Health Ministry, and the Ministry of Information and Broadcasting stressed that food labels must be treated as instruments of trust rather than marketing tools. Misleading promotions, particularly around health benefits, were singled out as dangerous both for consumer confidence and for public health.

The consultation also highlighted India's intent to align more closely with global standards. Technical sessions compared India's framework with international norms and showcased enforcement case studies, underscoring the government's push to modernize its regulatory regime. With over 700 participants from ministries, regulators, businesses, and consumer groups, the meeting reflected broad consensus that stronger accountability is needed to build trust and safeguard consumers in a rapidly evolving food market.

This development positions India at a turning point: moving beyond fragmented rule changes toward a more unified, globally aligned system where food labelling is not just a marketing device but a cornerstone of consumer protection.

https://www.foodnavigator-asia.com/Article/2025/09/03/food-labels-go-beyond-marketing-india-signals-tighter-rules-ahead/

India Cuts Tax on Plant-Based Milk & Meat to Make Vegan Food More Accessible

This article highlights a significant policy shift in India's Goods and Services Tax (GST) framework, aimed at making plant-based foods more affordable and accessible.

The reforms, approved in September 2025, reduce the GST on plant-based milk, meat alternatives, and other vegan foods to 5%, aligning them with many animal protein products. Previously, plant-based milks carried rates as high as 18%, while soy proteins and similar ingredients were taxed at 12%. In contrast, fresh cow's milk was untaxed and most fresh meat had either no levy or just 5%.

By lowering the tax burden, the government has effectively narrowed the price gap between conventional animal proteins and plant-based alternatives. This is expected to encourage broader adoption of vegan foods in India, where affordability has been a major barrier despite rising consumer interest. The reform also extends to microbial proteins and nutritional yeast, which now benefit from the same reduced rate.

Industry stakeholders view this as a progressive move that supports healthier diets, environmental sustainability, and the growth of India's plant-based sector. It comes at a time when consumer demand is shifting: surveys show that more Indians want to increase their intake of plant-based meat (43%) than conventional meat (36%), and lactose intolerance affects around 60% of the population, boosting interest in dairy alternatives. The vegan food market, which grew 18% between 2021 and 2024, is projected to expand 18-fold over the next decade.

The reform is also the result of sustained advocacy by startups and industry associations, who have long argued that tax parity is essential for the sector's survival and growth. Globally, similar campaigns are underway, as livestock agriculture continues to benefit disproportionately from subsidies compared to plant-based alternatives.

https://www.greenqueen.com.hk/india-gst-tax-plant-based-milk-meat-vegan-food-vat/

Non-UPF pilot program aims for industry-wide definition of ultra-processed foods

The Non-UPF Verified pilot program is an industry initiative to create the first third-party certification standard for foods that are not ultra-processed.

The program is spearheaded by Megan Westgate, founder of the Non-GMO Project, and is modelled on that earlier success in food labelling. It brings together 16 food brands to test and refine what will become a certification seal for non-ultra-processed foods. Already, more than 200 brands have expressed interest in joining, showing strong momentum across the food industry.

The pilot is designed to address growing calls for regulation of ultra-processed foods (UPFs). The U.S. Department of Health and Human Services (HHS) is simultaneously working on a federal definition of UPFs, so the Non-UPF Verified initiative

aims to complement—not duplicate—government efforts. Much like the Non-GMO Project did in the early 2000s, this program seeks to provide consumer-facing transparency while aligning with eventual regulatory standards.

Key aspects of the pilot include: Evaluation process: Stakeholders are debating definitions, product categories, and processing techniques under the Chatham House Rule to encourage candid input. Criteria: Focus on minimal processing, banned ingredients, and classification of processing techniques. Guidance is drawn from EU frameworks, state-level proposals, and retailer ingredient lists. Practicality: The standard must balance rigor with achievability so that brands can realistically reformulate products and consumers can see the seal on grocery shelves. Outcome: The finalized Non-UPF Verified standard will be published in fall 2025, accompanied by industry education and consumer research.In short, this pilot program is an industry-wide effort to define and certify non-ultra-processed foods, aiming to build consumer trust, encourage reformulation, and align with emerging federal definitions of UPFs.

https://www.foodnavigator-usa.com/Article/2025/08/05/non-upf-pilot-program-aims-for-industry-wide-definition-of-ultra-processed-foods/

Hydrolysed milk protein as sleep support ingredient

South Korea's Ministry of Food and Drug Safety (MFDS) is moving toward broadening the regulatory framework for health functional foods by considering hydrolysed milk protein as an officially recognized raw material for sleep support.

At present, the ingredient can only be used under individual approval, meaning companies must submit safety and functionality data before being permitted to manufacture products containing it. Approved products are currently limited to the claim that they "may help relieve stress-related tension."

The new proposal would allow hydrolysed milk protein to be added to the general list of permitted raw materials, enabling manufacturers to use it at a specified level and to make the expanded claim that it "may help relieve stress-related tension and improve sleep quality" without undergoing the lengthy approval process. MFDS has stated that the move is intended to revitalize and promote related industries.

Alongside hydrolysed milk protein, the MFDS is also reviewing the inclusion of zinc citrate and ferric saccharate in the permitted raw materials list. Zinc citrate, already recognized internationally, offers high zinc content and improved sensory properties in syrups, and is marketed in supplements for skin and immune health. Ferric saccharate, particularly in microencapsulated form such as AB-Fortis, has demonstrated better tolerability than conventional ferrous sulphate and is used in iron supplements to support red blood cell production.

The regulator is additionally tightening standards for aloe gel raw materials. A new requirement would mandate that aloe gel contain at least 30 mg/g of total polysaccharides, with an iodine starch reaction test introduced to detect adulteration with cheaper starch-based thickeners. Aloe gel is currently permitted in health functional foods through various processing methods, including drying, pulverizing, grinding, filtering, pressing, and concentrating.This set of regulatory updates reflects South Korea's broader effort to harmonize with international standards, expand functional food categories, and enhance consumer trust in product quality.

https://www.nutraingredients.com/Article/2025/08/05/mfds-considers-hydrolyzed-milk-protein-as-sleep-support-ingredient/

Animal-Free Meat Fat in the US

Nourish Ingredients, an Australian food tech startup, has achieved a significant regulatory milestone in the United States with its precision-fermented fat product, Tastilux.

The Flavor and Extract Manufacturers Association (FEMA) has granted GRAS (Generally Recognized as Safe) status to Tastilux,

which is produced using the fungal strain Mortierellaalpina. This approval allows Nourish Ingredients to immediately begin commercial sales to US food manufacturers, opening the door to broader international expansion.

Tastilux is designed to replicate the flavour and cooking properties of animal fats, particularly in plant-based meat alternatives such as chicken, beef, and pork. By facilitating the Maillard reaction, it delivers aroma, taste, and texture similar to conventional meat. The fat is effective at very low inclusion rates—around 1%—and is positioned as a middle ground between tropical oils like palm and coconut, which carry environmental and sensory drawbacks, and cell-cultured fats, which remain costly.

The company envisions Tastilux as a versatile ingredient not only for meat alternatives but also for snacks, ready meals, and tallow replacements. This latter application is particularly timely given the growing consumer interest in beef tallow as a substitute for seed oils. Nourish Ingredients emphasizes that its fermentation-based fat avoids the environmental and supply constraints of animal-derived products while delivering authentic flavour.

Unlike the FDA, which regulates food additives broadly, FEMA's GRAS designation applies specifically to flavour additives. The approval followed months of dossier preparation, safety reviews, and expert panel evaluations. Nourish Ingredients is currently trialling Tastilux with US partners and sees this milestone as a catalyst for advancing regulatory pathways in other markets, including Singapore, Australia, the UK, and the EU.

The company has already scaled production through a partnership with China's Cabio Biotech, achieving industrial-scale output sufficient to meet demand for 170,000 tonnes of end product. It has also secured nearly $40 million in investment and entered partnerships in multiple regions, including with New Zealand dairy giant Fonterra for its sister product Creamilux, a fat alternative for non-dairy applications.

Nourish Ingredients is part of a rapidly growing fat alternatives sector, alongside innovators such as Yali Bio in California, C16 Biosciences in New York, Melt&Marble in Sweden, and Bill Gates-backed Savor, which uses thermochemical processes to transform carbon into triglyceride blends. Tastilux's approval positions Nourish Ingredients at the forefront of this emerging market, offering a scalable, sustainable solution to one of the biggest challenges in plant-based and blended protein foods: delivering authentic meat-like flavour and functionality.

This development underscores how precision fermentation is reshaping the fat and flavour landscape, bridging gaps in taste, sustainability, and consumer acceptance for next-generation food products.

https://www.greenqueen.com.hk/nourish-ingredients-tastilux-fema-gras-us-precision-fermentation-fat/

A uniform UPF definition could bring clarity – and disrupt the food system

A federal definition of ultra-processed foods (UPFs) promises clarity in a landscape where multiple states are advancing their own rules, but it also risks significant disruption across formulation, supply chains, retail operations, and access to affordable nutrition.

The accelerated state-level attention to UPFs, compared with decade-long processes for rules like "healthy" claims or organic standards, has pushed FDA to explore a national approach that addresses nutritional gaps not captured by process-centric systems like NOVA.

State actions and FDA's evolving stance

California's 2023 Food Safety Act catalysed a broader state movement to restrict certain additives, with Florida, Arizona, and Utah proposing similar measures. In parallel, FDA is weighing a national UPF definition and has informally signalled phase-outs for several synthetic colours by 2026, reflecting mounting pressure to align food supply with emerging health concerns. Industry interest in a uniform definition is driven by the need to operate consistently across 50 states rather than navigate fragmented, overlapping mandates.

Potential disruptions across the food system

A uniform UPF definition could trigger reformulation to reduce or replace stabilizers, emulsifiers, and other additives, impacting texture, mouthfeel, shelf stability, and cold-chain or ambient distribution dynamics. Shorter shelf lives would compress retail rotation and inventory management, potentially increasing waste and costs. Ingredient substitution may intensify demand for specific materials, introducing sourcing constraints, price volatility, and reformulation spillovers into upstream commodity markets. Downstream, consumer sentiment could be affected by visible changes in product appearance, functionality, and availability, requiring careful communication to maintain trust.

Industry comment considerations for the federal RFI

Technical submissions will likely centre on how UPF characteristics relate to health outcomes, the functional roles of additives in safety and quality, and the feasibility of reformulation at scale. Evidence should distinguish ingredient count and type from nutritional value and consider cumulative formulation effects rather than single-component judgments. Comments that detail stability testing, sensory and nutrition trade-offs, and supply-chain readiness can help avoid unintended consequences, while demonstrating how science-based thresholds or subcategories can balance risk reduction with product integrity.

Intersections with existing policies and systems

A UPF definition will overlap with front-of-pack labelling, dietary guidelines, food standards of identity, GRAS and food additive rules, and state-level bans. Policy coordination is essential to prevent conflicting requirements, dual compliance burdens, and consumer confusion. Harmonization should address how UPF classification interfaces with nutrient profiling (HFSS), fortification policies, and innovation pathways for reformulated products, including clarity on acceptable functional additives that preserve safety, nutrient stability, and shelf life.

Strategic outlook

The path forward favours a science-grounded framework that distinguishes nutrient-poor UPFs from nutrient-dense, affordable options, and recognizes functional processing that preserves food safety, nutrition, and accessibility. A phased approach, aligned with robust evidence and practical timelines, can mitigate disruption while providing the clarity stakeholders need. Industry deliberation is already underway, with early reformulations illustrating both the feasibility and complexity of change in a system where processing and nutrition are deeply intertwined.

https://www.foodnavigator-usa.com/Article/2025/08/18/uniform-upf-definition-clarity-or-chaos-for-the-food-system/

A federal definition of ultra-processed foods is in the works, industry weighs in

The article describes a coordinated effort by the FDA, HHS, and USDA to establish a standardized federal definition of ultra-processed foods (UPFs), a move framed as part of the Make America Healthy Again initiative.

Federal agencies estimate that UPFs make up 70% of packaged foods in the United States and are driving chronic illnesses such as cardiovascular disease, Type 2 diabetes, cancer, obesity, and neurological disorders. A unified definition is intended to provide transparency for consumers, guide public health initiatives, and support programs like the Make Our Children Healthy Again Assessment. The agencies have issued a request for information, open for public comment, to gather data and criteria that will inform the definition, with an emphasis on scientific rigor and health outcomes rather than processing alone.

Industry groups have responded with cautious support. The International Food & Beverage Alliance, which includes companies such as Coca-Cola and Ferrero, welcomed the effort but warned against definitions based solely on processing methods, arguing that processing is not inherently indicative of nutritional value. They emphasized that many processed foods, such as fortified cereals and shelf-stable dairy alternatives, contribute positively to nutrition and food security. Similarly, the Consumer Brands Association stressed that

classifying foods as unhealthy simply because they are processed risks misleading consumers and exacerbating health disparities. Both groups criticized the NOVA classification system, which defines UPFs by their degree of processing, as lacking scientific grounding.

Alongside federal efforts, private initiatives are emerging. Megan Westgate, founder of the Non-GMO Project, has launched Non-UPF Verified, a voluntary certification program currently in pilot with sixteen brands. This initiative aims to provide product-level standards that go beyond the NOVA framework by evaluating ingredients and processing methods directly with manufacturers. Westgate positioned the program as a proactive solution, similar to how the Non-GMO Project preceded federal GMO disclosure rules, and argued that deeper scrutiny at the product level is essential for meaningful change in the food system.

Advocacy groups also weighed in. The Center for Science in the Public Interest welcomed a standardized definition but cautioned against overly narrow criteria that rely on limited lists of additives. They suggested that even before a definition is finalized, agencies could take steps to reduce harmful UPF consumption, such as setting added sugar reduction targets and finalizing front-of-package nutrition labelling. Industry-led transparency tools like SmartLabel and Facts up Front were cited as existing mechanisms that could complement regulatory efforts.

Overall, the article highlights the tension between clarity and nuance in defining UPFs. Regulators seek a definition that is simple, enforceable, and effective at improving public health, while industry and advocacy groups emphasize the need for scientific rigor, nutritional context, and consumer trust. The debate underscores the potential impact of a federal definition on labelling, consumer perception, and the broader food system.

https://www.foodnavigator-usa.com/Article/2025/07/24/industry-responds-to-fda-usda-call-for-input-on-upf-defintion/

Advancing Safety in the Seafood Supply Chain

This highlights the growing importance of coordinated seafood traceability systems in combating illegal, unreported, and unregulated (IUU) fishing, which costs the global seafood economy an estimated $36.4 billion annually and accounts for about 20% of wild-caught fish. Beyond financial losses, IUU fishing undermines marine ecosystems, destabilizes coastal economies, and erodes consumer trust in seafood safety.

The Global Dialogue on Seafood Traceability (GDST), established in 2017 by the World Wildlife Fund and the Institute of Food Technologists' Global Food Traceability Center, has been central to addressing this challenge. GDST created interoperable standards that allow seafood traceability systems across countries and companies to "speak the same language," ensuring that information about catch location, processing, and shipment can be shared and verified globally. This harmonization makes it easier to detect illegal catches and strengthens consumer confidence.

A major milestone came in January 2025 when Indonesia, one of the world's largest seafood exporters, became the first country to align its national traceability system, Stelina, with GDST standards. This move captures critical data at every stage of the supply chain—from fishing vessels to export—reducing opportunities for IUU fishing and setting a precedent for other nations. The initiative also positions Indonesia to meet diverse market requirements while contributing to global harmonization.

The blog notes that similar regulatory efforts are underway elsewhere. Europe's Fisheries Control Regulation mandates vessel tracking, electronic catch reporting, and phased digital traceability, while countries like the United States, Chile, and Japan are updating their rules with comparable goals. Together, these efforts reflect a global momentum toward standardized traceability.

For industry stakeholders, harmonized standards promise streamlined compliance, scalable tools, and stronger supply chains.

For consumers, they mean safer, more reliable seafood. The post concludes that global seafood markets are interconnected, and challenges like IUU fishing cannot be solved in isolation. Indonesia's leadership, combined with GDST's framework, demonstrates that harmonized standards are both essential and achievable, offering a path to safeguarding marine resources, protecting livelihoods, and ensuring sustainable seafood worldwide.

https://www.ift.org/news-and-publications/blog/2025/advancing-safety-in-the-seafood-supply-chain

Food, nutra policies must match risks, not stifle competition

This article highlights the tension between consumer protection and industry competitiveness in the regulation of food, beverage, and nutraceutical sectors across Asia-Pacific.

Experts at the Growth Asia Summit 2025 cautioned that while strict standards uphold credibility, they can also disadvantage compliant firms by slowing innovation and leaving them vulnerable to competition from less regulated or overseas products.

John O'Doherty, CEO of Complementary Medicines Australia, described Australia's Therapeutic Goods Administration (TGA) standards as both a blessing and a curse. They provide global credibility but are not aligned with consumer trends, making it difficult for companies to respond quickly to demand. He pointed to the Personal Importation Scheme, which allows Australians to buy unregulated supplements from overseas websites, as a major source of unfair competition. Jonathan Chew, CEO of the Infant Nutrition Council, agreed that safety must remain paramount but stressed that regulations should not undermine competitiveness or export growth.

China presents another challenge, with its lengthy approval process for "special foods" such as health products and infant formula. Registration can take three to five years, discouraging international firms and limiting consumer access to innovation. While the government has expanded the list of approved ingredients and claims, this has largely benefited domestic brands, leaving imported products at a disadvantage.

India's regulatory ambiguity adds further complexity. The lack of clarity over whether nutraceuticals should be classified as food or drugs has stalled innovation, particularly for multivitamin formulations that exceed recommended dietary allowances. Products risk being misclassified, creating uncertainty for global firms entering the market. Sandeep Gupta of the Expert Nutraceutical Advocacy Council noted that this thin line between drug and nutraceutical has caused delays, with many products still on hold.

Panellists agreed that overcoming these hurdles requires reform and stronger industry collaboration. Elise Giles of H&H Group emphasized that responsibility for navigating regulations should not fall on individual companies alone. Instead, alignment across internal teams and collective support for industry bodies such as CMA and INC is essential to present a united front to regulators and push for proportionate, risk-based policies.

https://www.foodnavigator-asia.com/Article/2025/08/27/food-regulations-must-match-risks-not-stifle-competition/