



PFNDAI

# FOOD, NUTRITION & SAFETY MAGAZINE

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Ms Anuja Padte

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# FOOD AVAILABLE TODAY IS SAFE

Things have changed drastically over the last decade in several ways. Lifestyle has changed. Diets have changed.

The technology has made changes so much that not just the way we live but also the way we fight wars has changed. The recent conflict has shown the extent of change because of technology.

It has pushed the whole world to such dire conditions; there are all kinds of problems in most countries globally. The most worrisome is the largescale starvation that looks unavoidable even if there is

peace forthcoming in near future.

People have become reckless in using the newer forms of technological gadgets. It gives them a lot of power. One push of button can send sensational message to not just thousand but even millions in a short time.

Mark Twain said "A lie can travel halfway around the world while the truth is putting on its shoes." Even he may not have realized the speed the technology especially with social media WhatsApp has given to this spreading.

If we are to believe these scaremongers saying that our

milk, bread, grains, fruits and vegetables are all adulterated with unsafe and dangerous substances, we should all have been in grave long ago.

Every opportunity that some people get to scare people they unleash half-truth in such a way that it scares common people into believing that government and industry are trying to destroy the health of people for some commercial gain.

Not all the foods and products are healthy. There are people who try to unfairly make money through adulteration, many times leading to harmful results.

However, most of the foods bought in stores are safe. There are instances of milk being watered down or vegetable oil being used to make paneer. These are exceptions rather than rule.

Because of social media and other avenues freely available for those who are trying to make themselves popular by getting more likes and forwards. They do not realise or probably don't care for the consequences. More shocking the post, easier it is to attract people and spread it across. The technology gives them power to spread it so fast and become "an influencer" so easily, they are tempted to warp or twist the story to make it more impactful. They cause a lot of harm to people especially to those who are in lower economic sector who don't have the capacity to either get more expensive reliable branded products not get fresh fruits, vegetable, whole grains

to make flour out of it, and similar things.

They can't verify if the food is adulterated or unsafe, as those with the knowledge are reluctant to post the truth and the facts.

A mechanism is required to address these issues; ignoring them may be interpreted as being truthful and accurate. The FSSAI may list out the products in the market, where

the labelled information is disparaged by influencers' misinterpretation, or drawing erroneous and unscientific test result conclusions. A quick response on facts and science while the post is trending is necessary, through a group of professionals. By doing so, consumers will gain confidence in how they are kept safe and in good health.

**Prof Jagadish Pai, Editor,  
PFNDAI**



# DOES NUTRITION LABELLING HAVE DIETARY CAPABILITY?

AUTHOR

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Introduced several decades ago (US 1990; India 2008), the nutrition facts panel (NFP) was positioned as a major policy intervention to reduce NCDs. However, the magnitude of change has not been transformative.

Looking back (1990 to 2022), obesity rates have increased (US ~21% - 40.3%; Chile ~13.4%

- 38.9%; India ~0.79% - 7.27%), with similar trends in diabetes, hypertension, and ischemic heart disease.

Three decades should be sufficient to conclude that labelling is independent of consumption. If so, what more can an additional front-of-pack (FoPL) do when purchase intentions are unlikely to change consumption behaviour?

Labelling is structured for purchase moments. In a rushed decision-making scenario, consumers look for transactional details, such as branding, price, weight, and use-by dates.

The nutrition facts panel (NFP), inserted later, was force-fitted into the time-starved format: not an ideal educational spot.

On opening the pack, the nutrition message self-destructs, and who eats, how much, and how often is unaccounted. The front-of-pack (FoPL) and NFP information is momentary; it goes no further. Choosing better does not necessarily mean eating healthier.

We now need a simple explanation of dietary capability. The Multiple Traffic Light (MTL) system provides a useful analogy.



When red signals stop (a warning), the motorist obeys; he knows the risk of not doing so, but on a deserted road, with no traffic in sight, he drives through, as there is no risk. Behaviour is based on (a) cognition, i.e., the knowledge and comprehension of context, whether there is risk or not, and (b) control; execution of that knowledge: should I drive on or not? Dietary capability works similarly.

The core argument is that NFP and FoPL are not designed for consumption. A generous portion of a chocolate birthday cake (100g) is high in fat (~20g), saturated fat (~8g), and sugar (~40g). The once-a-year celebratory event, using food frequency analysis (FFQ), provides about 0.05g of fat, 0.02g of saturated fat, and 0.12g of sugar: it presents no health risk.

However, it will be flagged with three red lights under the MTL FoPL system, for 'high in' fat, saturated fat and sugar. Decision-making available to motorists is unavailable to consumers. While motorists stop or pass through a red signal, depending on risk, a consumer has to (a) mentally



cross-reference each product with everything else eaten on that day; and (b) check total intake for exceeding thresholds (RDA): fat 67g/day; saturated fat 22g/day and sugar, 50g/day. The mathematical burden is discouraging.

In real-life situations, food frequency (FF) provides context for why or when a food is consumed and control over how much and how often it is eaten: both knowledge and execution are available, as in 'MTL traffic situations'. It flags rare indulgence, occasional gratification, and habitual use, expressed as hardly ever, 2-3 times a week, or daily.

Dietitians use such enquiries (exposure assessment) before recommending a diet plan (risk

management). Similarly, surveys and epidemiological data provide exposures that require appropriate measures. Have the FoPL proponents done the same?

Nutrition labelling is essential for informed choice and for influencing a population's purchasing behaviour. It works well in countries with high-conformity consumption patterns, encouraging industrial food systems. India's sharply fragmented patterns are not easily amenable to such market conversions: a major hurdle to transitions.

The prospects of an FoPL warning on reducing (percent) saturated fat, salt and sugar are unknown, nor is it stated as a public health goal.



# WHEY PROTEIN CONCENTRATES AND ISOLATES: PREPARATION AND APPLICATIONS



AUTHOR

**Dr Shashank Bhalkar,**  
Executive Director,  
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Annually, 150 million tonnes of milk are produced in Europe alone, and almost fifty per cent of it is processed by the dairy industry to produce cheese. (1) In this whole process, protein, such as casein and butter fat, is extracted, and 80 - 90 % as liquid whey is produced, which is a main byproduct of the dairy industry.

This is a yellow-green-coloured liquid because of the presence of riboflavin with about 6.5% solids. 1 - 2 Kg of Cheese produces 9 -

10 Kg of whey. Two kinds of whey are produced in cheese manufacturing. Sweet whey is produced as a byproduct of rennet or enzymatic cheese-making. Acid whey is produced during the manufacture of cottage cheese or Greek yoghurt. The main difference between the two is their pH. The acid whey has a pH between 3.5 and 4.5, whereas the sweet whey has a pH of 6 to 6.5. The dry mass compositions of both are similar. They contain 10 - 12 % protein, 71 - 75% lactose, 8 - 9% fats, and 4 - 10% minerals. Because of the high organic load, they have a high BOD of 48 g/ L and a high COD of 95 g/ L. Therefore, it is advisable to process the whey further to extract the important, valuable component, whey protein. However, such processing is not possible for small

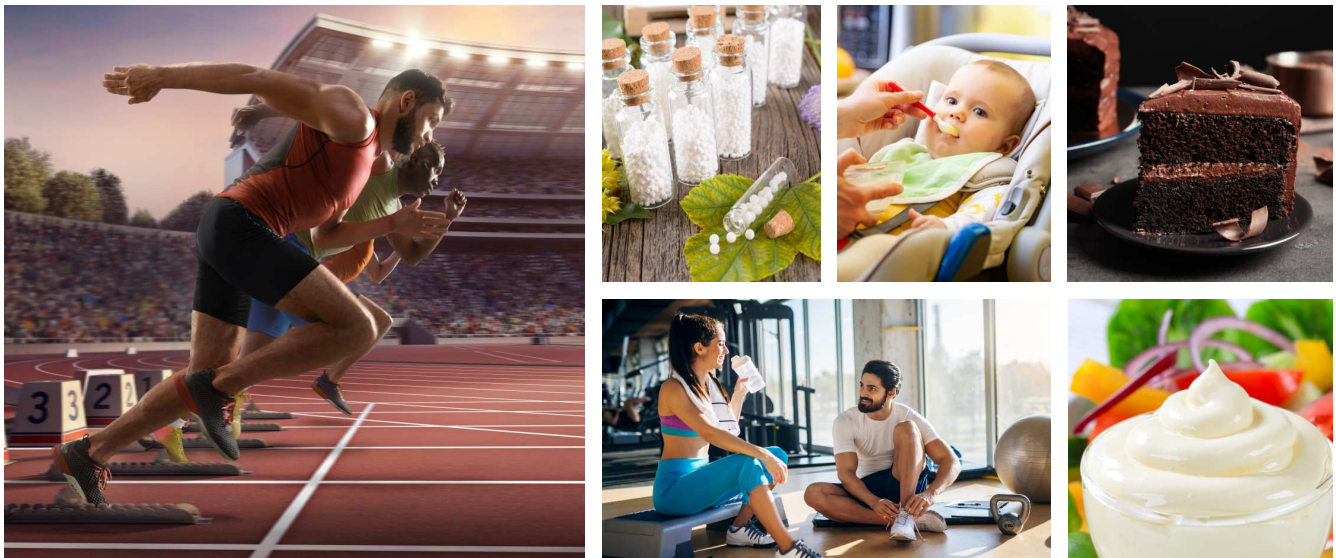
manufacturers because of high investment and operational costs. Whey, if merely concentrated, will not be a balanced source of nutrition because of its high lactose and minerals.

When purified, whey proteins exhibit good nutritional and functional properties and have a wide range of applications in food and nutraceutical products. Whey protein contains several fractions, each with unique nutritional properties. a) Beta-lactoglobulin (50 - 55%): High in essential amino acids, b) alpha-lactalbumin (20 - 25%) Rich in Tryptophan, c) Bovine serum Albumin (5 - 10%) Large protein with good amino acid profile, d) Immunoglobulins (10 - 15%) Provides immunity, and e) Glycomacropetides, Lactoferrin, and other minor proteins: Various functional properties.



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## Manufacturing of Whey protein concentrate/ Isolate (WPC and WPI):

(2) (3)

Whey proteins are available in different forms, such as whey powder (8-12% protein and over 70% lactose), WPC (34-89% protein), and WPI with over 90% protein and almost no lactose.

Demineralised whey powder is traditionally prepared, where whey is concentrated by evaporation or reverse osmosis.

This is followed by demineralisation using ion exchange columns and subsequently spray-dried. Membrane separation processes are widely used in the purification of whey to manufacture WPC and WPI. The knowledge of membrane processes is important to understand the manufacturing process.

These tangential filtration processes involve passing the liquid through a semipermeable membrane. Two fractions are obtained: the retentate or concentrate, which is the portion containing molecules that cannot pass through the membrane, and the permeate or filtrate, which is the fraction that crosses the membrane. Different types of

membranes are available with respect to the pore size and cut-off point with respect to the molecular mass. Use of five types of membranes, which are reported to be used in the tangential filtration process, sometimes in combination. They are MF (Microfiltration), UF (Ultrafiltration), NF (Nanofiltration), RO (Reverse Osmosis), and ED (Electrodialysis).

solvents. These membrane processes are followed by spray or freeze drying to obtain whey powders of the desired protein content with less than 5% moisture.

Comparison of the filtration techniques, with respect to pore sizes and the type of components retained in each process, is shown in [Table 1](#) below.

**Table 1**  
**Comparison of membrane separation of milk components**

Type	Pore size nm	Retained compounds	MW of the compound (kDa)
MF	20 - 4000	Bacteria, fat globules, and casein micelles	100 - 500
UF	20 - 200	Whey proteins	1 - 100
NF	<2	Lactose, Divalent salts	0.1 - 1
RO	<2	Monovalent salts	<0.1
Electro-dialysis	-	Removal of salt and deacidification of solutions containing neutral components	-

This technology has several advantages over traditional processes, namely reduction in wastewater production, reuse and production of clean effluent, low energy consumption compared to evaporation and distillation processes, and ease of combination with other processes with moderate process conditions.

Most important is that there is no use of additives or

Generally, to concentrate whey proteins, the molecular weight cut-off used is 10 kDa, and the filtration is usually done at a temperature of 50 - 55 degree C with a transmembrane pressure of 300 - 400 kPa and a membrane pore size of 250nm. Whey retentate contains protein, fat, insoluble salts, lactose, and soluble minerals that did not cross the membrane,

while the permeate contains mostly lactose.

The most common problems in membrane processing are related to the fouling of membranes, which are responsible for the decline in the permeation fluxes. This should be minimised as it reduces permeate flux and increases cleaning cycle costs to restore the productivity of the membrane. Whey proteins and minerals, especially Calcium and phosphate, contribute the most to fouling of UF membranes. Residues of processing, such as curd, lipids, enzymes, and microorganisms, are other factors responsible for affecting the membrane performance. They probably adsorb on the membrane surface, promote gelation in the polarised layer, or induce pore blocking.

The following are the different steps followed in the typical whey protein manufacturing process.

#### **Pretreatment and clarification:**

a) Preliminary filtration: The liquid whey is passed through to remove any residual cheese particles or large solids. This is a very critical step to prevent fouling in the subsequent steps. b) Pasteurisation: The whey is pasteurised at 72 - 75 degrees C for 15 - 20 seconds in a continuous flow system. c) pH adjustment: pH is adjusted to optimise

later processing steps. The acid whey is particularly important in the acid whey which is to be neutralized.

#### **Fat separation:**

The residual fat from raw whey must be removed to obtain a high-quality protein product. This is achieved by centrifugation to separate the fat, based on its density. Removal of fat is important because residual fat can affect the quality of the finished product in many ways. It will cause off-flavour because of fat oxidation, affecting the shelf-life and reducing the protein concentration in that proportion in the final product. Interfere with the subsequent filtration process.

#### **Membrane filtration:**

This is the heart of the whey protein manufacturing process. This technology allows selective concentration and purification of the whey proteins based on molecular size. This technology helps achieve a final product without the heat damage associated with the traditional methods. Several filtration technologies are used in sequence. The various membranes used and their significance are described in the earlier



discussion.

**Whey protein concentrate:** Whey protein concentrate is available in different protein concentrations (34 - 89%). The manufacturing process of WPC relies on ultrafiltration to selectively concentrate the protein while allowing minerals, lactose, and water to pass through the membrane. The specific concentration is controlled by: Ultrafiltration duration and pressure, diafiltration steps (adding water and re-filtering to wash out minerals and lactose, and final drying parameters.

**Whey protein Isolate:** It contains more than 90% of proteins with residual fat and lactose. This is achieved by additional processing steps beyond the WPC production. In the ion exchange chromatography method, the whey is passed through the ion exchange column. The protein molecules bind to the column, which is then released by changing the pH. Alternatively, multiple

diafiltration steps help to achieve a protein concentration of more than 90%.

### Concentration and drying:

The concentration is performed to increase the solids content using equipment such as a falling-film evaporator, a multiple-effect evaporator, or a mechanical vapour concentration evaporator. Drying is carried out by spray drying at an inlet temperature of 180-200 degrees C and an outlet temperature of 80-95 degrees C. The manufacturing process is depicted in Figure 1 below

### Functional properties and applications of whey proteins:

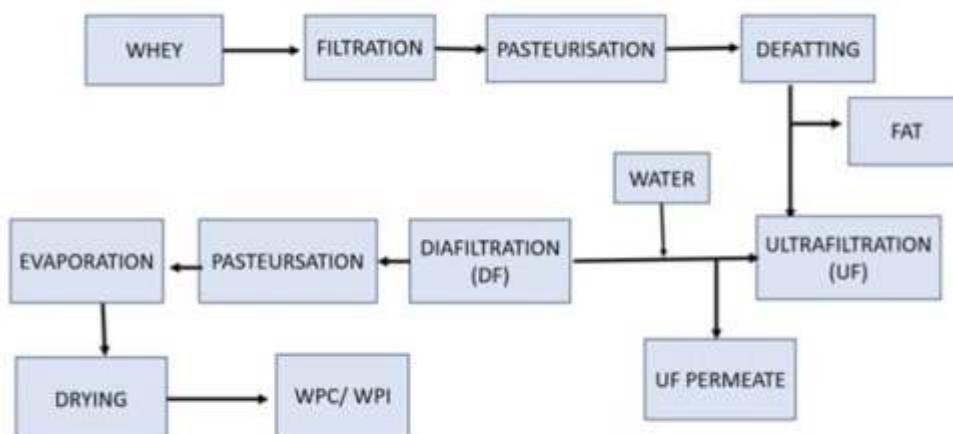
Whey proteins have a range of functional properties which influence the texture,

appearance and stability of food products and make them useful in many food applications. This is summarised in Table 2 below.

Table 2: Functional properties and food applications of whey proteins

Functional property	Food application
<b>Solubility:</b> Highly soluble across a wide range of pH	Clear beverages, acidic drinks
<b>Emulsification:</b> Stabilise oil in water emulsions	Salad dressings, soups, and sauces
<b>Gelation:</b> Forms a gel when heated to around 70 degrees C	Processed meats, baked goods, and desserts
<b>Foaming and whipping:</b> They can stabilise foam by forming flexible film at the air-liquid interface	Meringues, mousses, whipped toppings, and aerated confections
<b>Water and fat binding:</b> Improve mouthfeel and water retention of the product.	Baked goods, yoghurts, and processed meat

Figure 1: WPC / WPI manufacturing process



Whey proteins find applications in infant formulae, where they help to correct the whey: casein ratio as human milk and also because of their high digestibility.

In sports nutrition, they are popular for weight gain products because of their high branched-chain amino acid content. They are used in protein bars, shakes, and ready-to-drink beverages.

In dairy products, they are used to enrich protein content and improve the texture of yoghurts, ice cream, and processed cheese. They find applications in therapeutic and clinical nutrition products. They are used in products like enteral nutrition and products for the elderly.

Whey was treated as waste for decades and was either dumped as effluent or used as animal feed. With technology available, it has now been transformed into

valuable byproducts such as WPC and WPI. With its excellent functional properties and exceptional nutritional profile, it is finding wide applications in food and nutraceutical products.

The market size of USD 9679.7 million in 2025 is expected to grow to USD 17527.3 million in 2033 at a CAGR of 7.5%. (5)

It has tremendous potential to grow because of its use as an important ingredient in food innovations and the rising trend of health awareness among urban millennials and working professionals.

1) <https://pubs.acs.org/doi/full/10.1021/acs.chemrev.2c00236>

2) (PDF) [Dairy By-Products: A Review on the Valorization of Whey and Second Cheese Whey](#)

3) <https://share.google/AtPyitN2qRfEegeUR>

4) [Whey Protein Concentrates: Production and Applications - Agriculture Notes by Agriculture.Institute](#)

5) <https://www.grandviewresearch.com/industry-analysis/whey-protein-market>



# HYDRATION INTELLIGENCE FOR INDIAN HEAT: A SMART FRAMEWORK FOR NON-ATHLETES!

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When most of us think about 'hydration', we picture athletes, sweaty jerseys, finish lines, and sports drinks clutched in hand. The rest of us quietly assume that the need to hydrate is something athletes have to contend with, not us. But here's the truth: marathons don't define hydration.

Your body, whether seated

at a desk at your job or standing in a local train, runs on water. Quite literally. Nearly 70% of the adult human body is water and relies on a stable internal fluid balance to support homeostasis. (Popkin et al., 2010)

Hydration is commonly reduced to advise on fluid volume—how much water to drink, how often, and in what form. This simplification focuses more on mass balance than

compositional nuances of beverages and other critical factors that influence hydration and address varied individual need-states.

Tropical countries like India further exaggerate conditions. With exposure to prolonged heat spells, high humidity, and diverse coexisting lifestyles, hydration errors are rarely acute and dramatic. Instead, they manifest as chronic, low-grade physiological strain—fatigue, reduced cognitive efficiency, and metabolic dysregulation (Dmitrieva et al., 2024; Chevront et al., 2014). This article reviews hydration through a multifactorial lens and proposes a SMART hydration framework the Indian, non-athletic populations.



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<sup>§</sup>Glucose is a source of instant energy. Electrolytes support hydration.

~Comparison shown is with a leading competitor brand. <sup>#</sup>Carbohydrates - Electrolyte formulation.





### Hydration Mechanism:

We often treat hydration as a mechanical act: drinking water equals a hydrated body—problem solved. However, physiologically, it is far more interesting.

Imagine of your body as a busy Indian city with several roads and traffic signals. When water arrives, it doesn't automatically reach every neighborhood. It has to maneuver through a maze of streets to reach multiple destinations. Inside the gut, this "traffic system" is governed by ion channels and multi-transporter systems that control what enters, how fast, and with what efficiency.

One of the most remarkable of these is the Sodium-Glucose Linked Transporter, or SGLT. When sodium and glucose, at a specific ratio, arrive together in the small intestine, they activate a highly efficient pathway that pulls water along with them into circulation. It's not magic—it's elegant biology (Wright et al., 2011).

What is important is that not all carbohydrates behave alike. Fructose, for

instance, uses different transporters, the Glucose Transporter (GLUT), functional but slower. Fructose is absorbed via facilitative transport that does not directly couple with sodium-dependent water uptake. These transporters enable the absorption of sugars such as glucose and fructose without requiring sodium. Sucrose (table sugar) on the other hand requires another step; it must first be broken down into glucose and fructose before absorption. **This collectively highlights the role of multiple transport pathways in hydration dynamics.**

To underscore a key principle: not all carbohydrates influence hydration in the same way. The route by which nutrients enter the body shapes how accompanying water is handled, retained, and utilized.

### Thirst Perception and the Concept of Euhydration

Thirst is a delayed physiological signal. By the time thirst is consciously perceived, plasma osmolality has already increased, and water deficit has essentially set in (Armstrong et al., 2012). From a biological standpoint, thirst signals deviation from an optimal state of hydration.

The physiological goal is 'euhydration': a state of maintained fluid adequacy in which intake matches ongoing losses. However, even such a tightly regulated equilibrium is continuously challenged in real-world conditions, particularly in tropical environments.

### Factors Influencing Dehydration in Hot and Humid Climates: The Indian Context

Dehydration in tropical settings is shaped by a convergence of multiple factors that operate simultaneously rather than in isolation. In India, for athletes and non-athletes alike, environmental conditions disproportionately influence hydration status.

#### 1. Heat, Humidity, and Season

High temperatures impose a constant thermal load, driving continuous sweating and fluid-electrolyte loss, while humidity limits sweat evaporation and effective cooling in turn (Cheuvront et al., 2014). Prolonged summers and humid monsoons cause persistent losses for most of the year.

#### 2. Individual Physiology

Fluid needs vary widely; body composition, sweat rate, and sodium loss differ based on genetics, acclimatization, and habitual heat exposure.

### 3. Health and Medications

Fever, infections, and gastrointestinal conditions increase fluid loss, while chronic diseases and medications such as diuretics, laxatives, some anti-hypertensives, and caffeine can further disrupt fluid balance or suppress thirst.

### 4. Behavior and Daily Habits

Sedentary routines may reduce fluid intake even as losses continue; air-conditioning blunts heat perception, and common beverages often replace fluids without adequately restoring electrolytes.

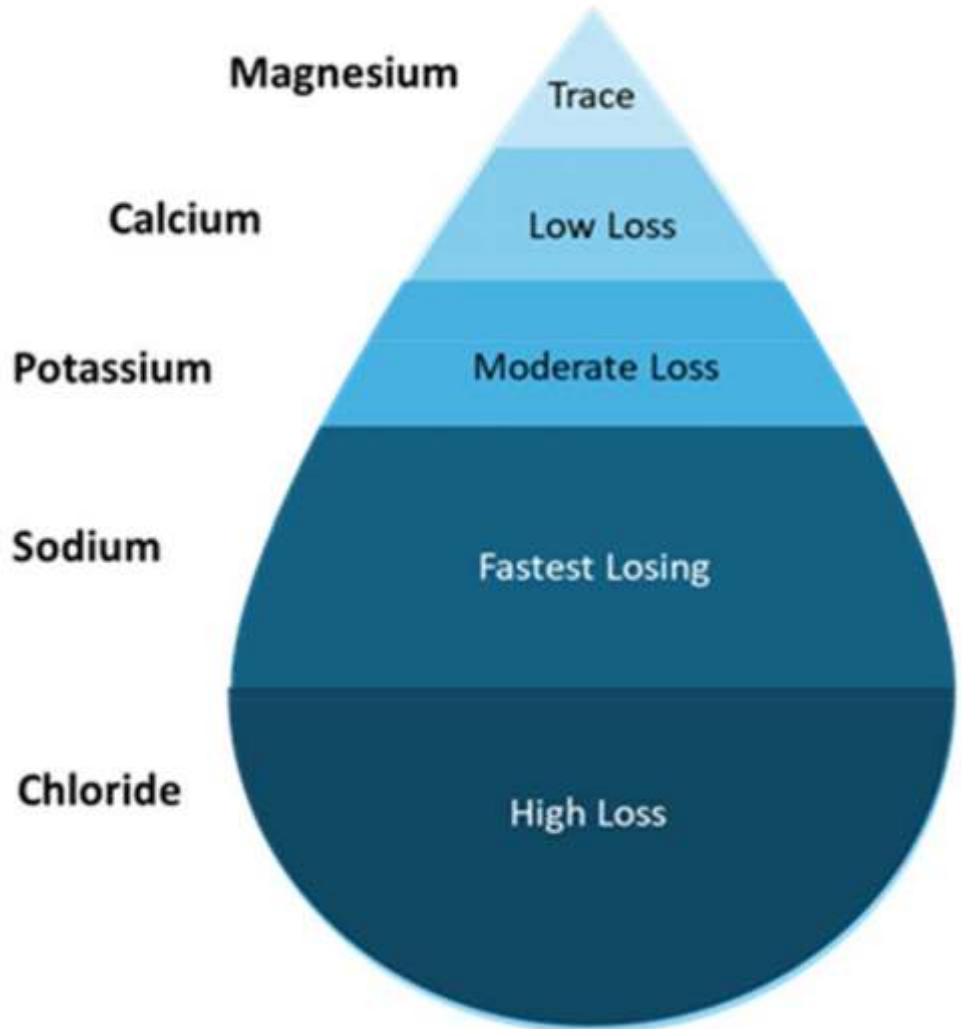
### 5. Timing and Duration

Fluid losses peak between late morning and mid-afternoon (11 am–4 pm), with prolonged exposure through commuting or outdoor activity allowing deficits to accrue.

Putting it all together, dehydration in India is often quietly metabolic rather than acutely symptomatic.

### Sweat Phenotypes in Indian Adults

Sweat contains variable concentrations of sodium, chloride, potassium, and other minerals essential for neuromuscular, cardiovascular, and cognitive function. Studies conducted in tropical populations demonstrate marked inter-individual



variability in sweat rate and sweat sodium concentration, even among heat-acclimatized individuals (Baker et al., 2017; Rivera-Brown et al., 2020; Surapongchai et al., 2021). Importantly, these losses are not confined to athletic exertion. Prolonged daily heat exposure—from commuting, domestic labor to incidental movement—can result in significant cumulative electrolyte depletion.

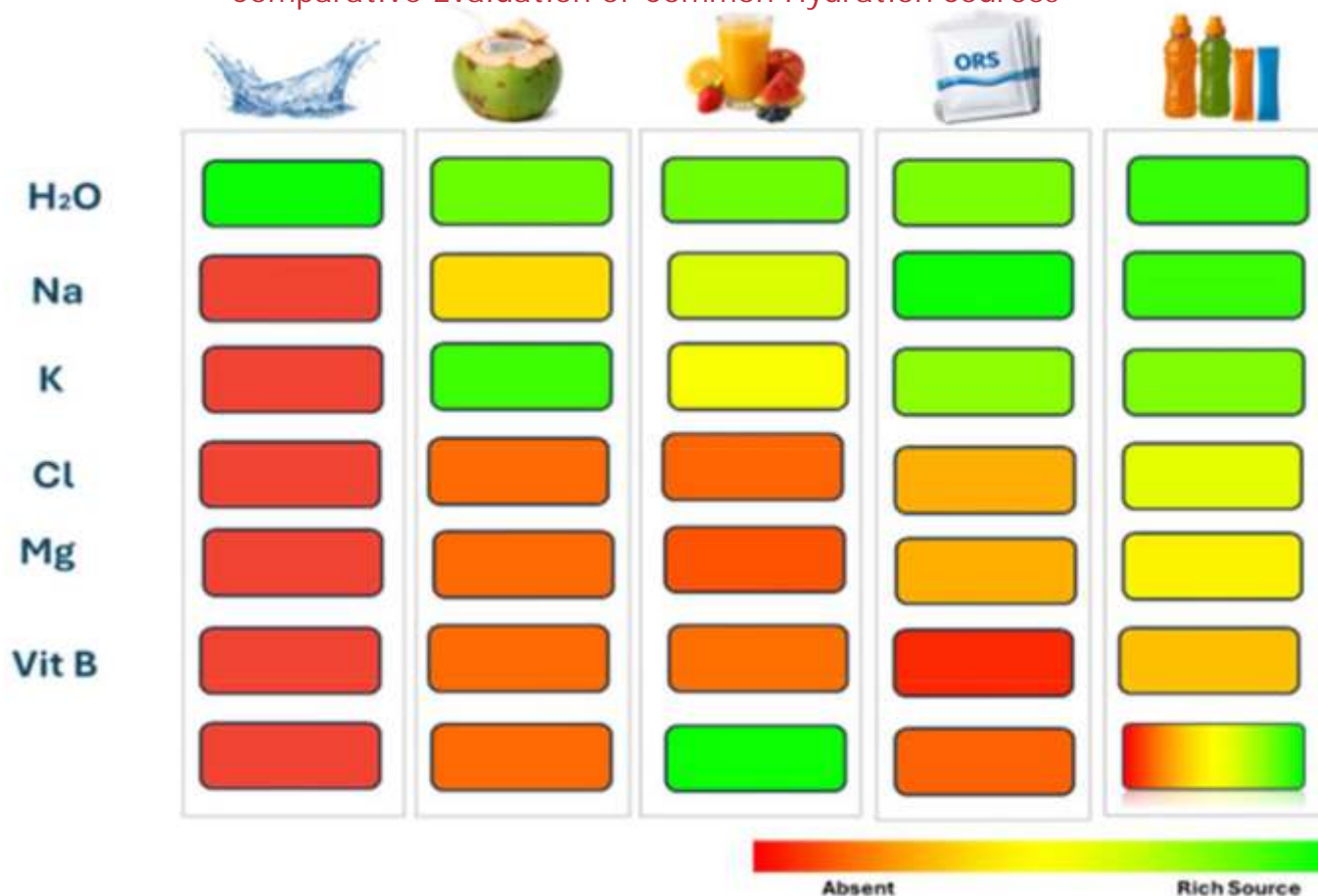
From a functional perspective, Indian adults broadly fall into three sweat patterns:

- Heavy salt sweaters,

characterized by visible salt residue and higher sweat sodium concentration

- Typical sweaters, who lose large fluid volumes with moderate sodium content
  - Low salt sweaters, with lower but still clinically relevant losses over prolonged exposure
- Even moderate daily sweating can result in sodium losses exceeding 1–2 g during peak summer months if not deliberately replaced (Baker et al., 2019). In such contexts, fluid replacement without electrolytes restores volume but not physiological balance.

## Comparative Evaluation of Common Hydration Sources



### Limitations of Water-Only Hydration

Plain water is essential but often insufficient. It restores fluid but not electrolytes lost in sweat, so relying on it alone can dilute sodium and worsen fatigue, headaches, and heat intolerance (Hew-Butler et al., 2015; Shirreffs et al., 2000). At a physiological level, electrolyte losses are subtle; at a systemic level, they translate into functional decline that clinically manifests as dehydration over time.

### Dehydration Watch-Out Indicators

Depending on the extent,

signals of dehydration can range from early warning signs to more severe manifestations. Thirst, a parched or sticky mouth, dry lips due to decreased saliva production, dark-coloured urine, reduced urination, fatigue, dizziness, and headaches are early indicators of mild to moderate dehydration.

More extreme cases are characterized by poor skin elasticity, inability to produce sweat or tears, cognitive confusion, muscle cramps, or hypotension.

Interestingly, even a 2% loss of body fluid can significantly impair physical performance (Yoshida et al., 2002)

### Summing It Up

A multitude of factors influence hydration status. Hence, a prudent way to remain in a state of euhydration is to adopt a SMART hydration strategy that seamlessly merges into daily routine.

### Hydration Intelligence, Put into Practice: The SMART Framework

Sweat-aware | Metabolically mindful | Autopilot-enabled | Region-attuned | Taste-tailored

SMART hydration is a practical tactic for staying optimally hydrated—quietly, consistently, and effortlessly.



making is no longer purely intuitive; wearable devices and health trackers that estimate sweat loss, monitor activity load, and capture physiological signals are beginning to offer practical cues on when hydration needs shift from simple fluid replacement to targeted electrolyte replenishment.

In practice, this could mean reaching for a higher-sodium offering after excessive sweating, resorting to ORS for recovery from clinical dehydration, or opting for lighter electrolyte fluids during long but low-intensity days. Glucose-containing beverages may be useful when fatigue sets in or absorption efficiency matters. Contrarily, in individuals with metabolic conditions requiring controlled glucose intake, low or no sugar options are better suited for routine hydration.



### S — Sweat-aware

Understanding your sweat rate and composition is fundamental to tailoring hydration needs with precision (Baker et al., 2017). SMART hydration eliminates guesswork by treating sweat as data—not discomfort. Daily sweating requires daily electrolyte support, not episodic correction.

### M — Metabolically mindful

Individual variation in sweating patterns, renal and bladder handling of fluids, skin water loss, and hormonal regulation governs how water and electrolytes are absorbed and retained, making hydration an inherently personalized process (Cheuvront et al., 2014). Metabolically aligned hydration supports homeostasis; without it, physiological regulation of fluids and electrolytes becomes inherently inefficient and unstable.

### A — Autopilot-enabled

Hydration lasts when it runs on routine, not just reminders. When fluid intake is woven into everyday habits rather than left to conscious effort, it remains more consistent—holding steady even amid busy schedules, mental load, and challenging environments. Effective hydration must function on ‘autopilot’

mode. The moment it becomes a task, consistency begins to fail.

### R — Region-attuned

Electrolyte needs are shaped by geography as much as by physiology. Climate, humidity, and dietary context modulate fluid losses, rendering one-size-fits-all hydration advice inherently incomplete (Cheuvront et al., 2014). Without environmental context, hydration advice loses relevance.

### T — Taste-tailored

Nutrition science succeeds only when endorsed by the palate. Sensory perception strongly influences intake. Effective hydration strategies must recognize that taste is not a cosmetic feature—it is a functional determinant of sustained use. Sensory acceptance governs repetition, rendering hydration functionally relevant.

### From Insight to Intake

So, what does SMART hydration translate into daily routine? It means choosing fluids with intent rather than defaulting to water alone. Everyday options—coconut water, buttermilk, ORS, or fortified electrolyte drinks—each serve distinct roles depending on what the body is losing and what needs to be restored. This decision-



The emphasis is not on what is popular, but on what is appropriate for the moment.

To conclude, hydration intelligence lies in drinking right rather than drinking more.

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# INDIAN CONSUMER PERCEPTION OF SWEETNESS: A DEEP DIVE INTO TASTE CULTURE, HEALTH

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Sweetness in India is far more than just a basic taste; it's intricately woven into the cultural fabric, evoking deep emotional connections, fulfilling diverse functional needs, and adapting to modern lifestyle shifts. This article explores the multifaceted perception of sweetness among Indian consumers, tracing its historical journey, analysing shaping factors, and highlighting emerging trends and challenges.

## 1. The Resonance of "Sweet" for Indian Consumers

In India, the word "sweet" conjures a rich tapestry of associations, deeply embedded in the national

psyche beyond mere taste. It highlights a complex interplay of emotions, functions, cultural contexts, and product recall.

### Key Associations:

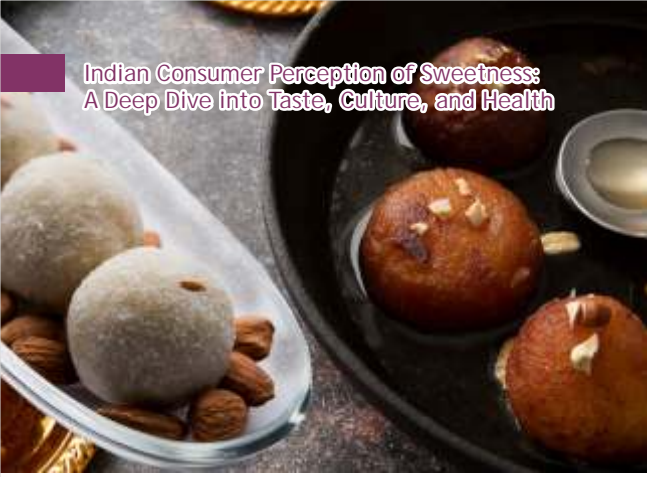
**Emotional Core:** Sweetness is intrinsically linked to happiness, joy, comfort, and celebration. It evokes nostalgia and serves as an edible hug, symbolizing well-being and sentiment.

**Functional Role:** Beyond emotion, sweets offer pure sensory pleasure, satisfy cravings, and act as mood elevators, providing a quick psychological lift.

**Cultural Context:** Sweet items are integral to rewards, treats, and hospitality, often offered as gestures of welcome and respect.

**Product Spectrum:** The term instantly recalls a diverse range of products, from traditional Indian sweets (Rasgulla, Gulab Jamun) to global favourites like Chocolates and Ice Cream.

Despite these overwhelmingly positive connections, a growing undercurrent links "sweet" with the concern: "not good for health." This emerging health consciousness, while not dominant, creates a significant "Sugar Paradox" that brands must navigate, balancing deep-seated positive associations with rising health awareness."



## 2. A Historical Journey of Sweetness in India

India's relationship with sweetness boasts a long and rich history, evolving from ancient reverence to modern innovation, profoundly shaping its cultural and culinary landscape.

**Ancient Times (3000+ years ago):** In ancient India, sweetness primarily came from natural sources like honey, fruits, and raw sugarcane juice. Beyond being a food additive, it held sacred and spiritual significance; sugarcane itself was auspicious, used in rituals to symbolize purity. Processing was minimal, preserving its raw essence.

**Classical Era:** India pioneered crystallized sugar, a transformative innovation that made sugarcane juice portable and storable. The Sanskrit word "Sharkara" became the etymological root for "sugar" globally. This invention built upon an existing tradition of Indian sweets like modak and laddoo, which already utilized jaggery and early sugar forms.

### Medieval Trade Routes & Colonial Era:

Originating in India, crystallized sugar evolved from a medieval luxury, symbolizing wealth and power, into a globally traded commodity. Colonial

industrialization, particularly by the British, scaled up production and refined techniques. This era sparked a rich cross-pollination of sweet traditions, leading to diverse new recipes and cultural fusions worldwide

**Modern Day:** Today, sweetness is no longer just a taste but a complex interplay of perception, culture, and continuous innovation. The focus has shifted from mere sweetness to nuanced flavor profiles, diverse textures, and varying intensities. Driven by global trends, health considerations, and technological advancements, the industry is constantly innovating with new ingredients, sugar substitutes, and product formats to cater to evolving consumer preferences while respecting traditional values.

## 3. Factors Shaping Indian Consumer Perception of Sweetness

Several key factors contribute to the unique way Indian consumers perceive and interact with

sweetness, making it a culturally rich and complex domain.

### Cultural & Ritual Drivers:


**Religious & Ritual Significance:** In India, sweets are not merely food; they are an integral part of religious and spiritual life. They are offered to deities (prasadam), distributed during festivals. This deep religious embedding imbues sweets with positive connotations of purity, blessings, and festivity.

**Ayurvedic Influence:** The ancient Indian system of medicine, Ayurveda, categorizes tastes (rasas) and emphasizes their role in balancing the body's doshas. Sweet taste (madhura rasa) is associated with nourishment, contentment, and energy. While encouraging moderation, Ayurveda acknowledges the intrinsic value of sweet foods, influencing the traditional inclusion of sweet elements in meals and snacks for balance and well-being.

**Regional Nuances:** India's vast diversity creates distinct regional sweetness preferences. South Indian sweets feature moderate jaggery and coconut, contrasting with North India's intensely sweet, milk-based confections (e.g., Gulab Jamun).



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NUTRIENTS\*

 \*Strength Nutrients\* refers to Vitamin D, Iron, Zinc, Vitamin A, B12, C. '2x Strength Nutrients' is based on 2 serves of Bournvita (40g) with 400 ml cow's milk vs 400ml plain cow's milk. Nutrient values are from IFCT, NIN 2017. Refer to pack for more details.



East Indian delicacies (e.g., Rasgulla) showcase delicate, subtly sweet, cheese-based textures. These regional palates are fundamentally shaped by local produce, culinary history, and cultural identity.

### Sensitivity & Taste Preferences:

#### - Higher Hedonic Peak:

Indian consumers prefer a more intense sweetness ('higher hedonic peak') than Western palates, finding sweeter products more satisfying. This preference is ingrained from childhood, fueled by very sweet traditional desserts.

#### - Cross-Modal Expectations:

Sweetness perception isn't isolated. Visuals, aromas, and textures all influence how sweet a food tastes. For instance, bright colors suggest more sweetness, while creamy textures enhance perceived richness. Brands strategically leverage these cross-modal cues in product design and marketing.

#### - Agriculture & Supply

**Shaping Taste:** India's palate was shaped by local sweeteners. Sugarcane, providing refined sugar and distinct caramel-flavoured jaggery, was paramount.

Regional date palm jaggery also contributed. These indigenous options defined "authentic" sweet profiles.

### Consumer Psychology:

#### - Sweetness as Social

**Bonding:** Sharing sweets is a powerful act of communal bonding in India. Whether it's distributing sweets after good news, sharing a dessert during a family meal, or offering them during festive visits, sweets facilitate social interaction and strengthen relationships.

#### - Indulgence vs. Health

**Trade-off:** A growing psychological tension exists between the desire for the indulgent pleasure of sweets and the increasing awareness of health implications. Consumers often rationalize their indulgence (e.g., "it's a special occasion") or seek out smaller portions or "healthier" versions to mitigate perceived guilt, demonstrating a nuanced approach to consumption.

### 4. The Many Facets of the Sweetness

#### Spectrum: Beyond Simple Taste

Sweetness in India is not merely a singular taste sensation; it's a rich, multi-dimensional experience influenced by various sensory attributes.

Understanding this spectrum is crucial for crafting appealing sweet products. Sweetness perception is a multi-faceted experience for Indian consumers, who often prefer high intensity but dislike "sickly sweet." The key is balance, where sweetness harmonizes with other tastes (like sour or bitter) and flavors (e.g., cardamom, caramel). Texture (creamy, crunchy) significantly influences enjoyment, as does a pleasant aftertaste. Additionally, flavor overlays and judicious sweet & sour combinations add complexity and refreshment. Ultimately, success in the sweets market hinges on achieving this harmonious balance across intensity, texture, and complementary flavors, avoiding overly sweet or imbalanced profiles.

### 5. The Functional Roles of Sugar in Products

For consumers, sugar serves multiple important functions beyond just taste, acting as a versatile ingredient that influences various aspects of food and beverage product

- **Energy Boost:** Provides quick glucose for immediate energy.
- **Enjoyment & Indulgence:** Enhances palatability, creating a "treat" or "reward" sensation.
- **Flavor Enhancement:** Acts as a flavor enhancer,

and amplifying other tastes.

- **Preservation:** In high concentrations, it extends shelf life by inhibiting microbial growth.
- **Mouthfeel & Texture:** Influences physical properties like browning, tenderness, smoothness (in ice cream), and crystalline structures (in candies).
- **Balance & Flavor Modulation:** Skilfully balances, masks, or elevates other flavors for a more harmonious taste experience.

## 6. Consumers' Sweet Snacking Motivations

Sweet snacking is a prevalent behaviour among Indian consumers, driven by a complex interplay of emotional, functional, and social factors, each fulfilling a different need.

Consumers' sweet snacking is driven by a mix of Emotional, Functional, and Social Motivations.

Emotional Motivations are rooted in psychological comfort, including, a primal desire for something sweet, seeking "me time," unwind & relax, or relieve boredom, acting as a treat/reward, improving mood or relieving stress. Functional Motivations address physiological needs like providing a quick energy boost, perceived as a nutritional daily fill, satisfying hunger and thirst, serving as a complement to meals or beverages, social Motivations foster

interpersonal connections, Social factors like enabling shared time and experiences with others, being integral to shared celebrations and cultural bonding.

## 7. The Sugar Paradox:

**Indulgence vs. Health**  
The "Sugar Paradox" describes a significant psychological conflict for Indian consumers, who are torn between the immediate gratification and deep cultural significance of sweet foods versus a growing awareness of their potential negative health impacts. While conscious, health-oriented choices like calorie reduction drive a positive feeling of "taking action" towards well-being, sweets also serve as a powerful emotional comfort, easing negative feelings during stress or hunger. This internal duality presents a critical challenge and opportunity for the food industry: to offer solutions for "permissible" or "unguilty" indulgence that effectively bridge the gap between consumer desire and rising health consciousness.

## 8. Market Trends and Emerging Themes

The Indian sweet market is highly dynamic, reflecting changing consumer preferences, evolving lifestyles, and a growing emphasis on health and wellness. Several key trends

Indian Consumer Perception of Sweetness:  
A Deep Dive into Taste, Culture, and Health



and themes are shaping this landscape.

## Key Emerging Themes:

These themes represent future directions and consumer expectations. Consumers, grappling with the "Sugar Paradox," are driving key trends in sweet food consumption. They seek **guilt-free indulgence** through **healthier ingredients** and **portion control**, alongside **personalized offerings** and **multisensory experiences** that go beyond taste. Health-conscious snacking for **functional benefits** and **social & emotional snacking** for comfort or shared joy are also paramount. This culminates in a strong demand for **healthier versions of indulgent foods**, where taste remains a crucial factor.

## 9. Obesity in India: A

**Multidimensional Challenge**  
The rise of obesity in India is a complex public health crisis, not solely due to processed food, but a multidimensional issue rooted in socioeconomic, lifestyle, and dietary changes. Moderation is crucial for a healthy lifestyle.

**Obesity is driven by a perfect storm of factors:** widespread dietary shifts towards high-calorie, low-nutrient foods. This is compounded by an increasing culture of eating out and ordering online, leading to higher calorie intake. Concurrently, modern lifestyles promote sedentarism with long sitting hours and increased screen time, coupled with a general decline in physical activity and exercise. Finally, chronic stress contributes through hormonal imbalances and emotional eating.

Obesity is a systemic problem requiring a holistic approach, integrating dietary choices, activity levels, stress management, and access to healthy options.

## 10. Consumer Behaviour: Global vs. India

Global consumers typically assess sugar intake through common sense, ingredient lists, nutrition panels, and portion size. In stark contrast, Indian consumers heavily rely on internet search and are significantly influenced by social media (influencers, viral trends) for health and sugar information, favouring accessible, relatable digital content over traditional medical advice. This

highlights the critical need for brands in India to develop robust digital and social media strategies to engage consumers and shape perceptions effectively. **Accessibility and Relatability:** Social media content is often more accessible, relatable, and presented in engaging formats than traditional medical advice, making it a preferred source for many.

This difference implies that brands operating in India need a strong digital presence and a robust social media strategy to engage with consumers, provide credible information, and influence perceptions around their sweet products and healthier alternatives.

## 11. A Call to Action:

Thought Starters for Industry and Government Addressing the complexities of sweetness perception, consumption, and its health implications in India requires a concerted and collaborative effort from both the industry and governmental bodies.

### For the Industry:

- **Smarter/Innovative Product Development:** This involves moving beyond simple sugar reduction to holistic product redesign.

### - **Formulation Innovation:**

Explore novel sugar reduction technologies, alternative sweeteners (natural or artificial), and

flavor modulation techniques to maintain taste appeal with less sugar.

### - **Ingredient Innovation:**

Incorporate functional ingredients like fiber, protein, or micronutrients to enhance the nutritional profile of sweet products.

### - **Texture & Mouthfeel**

**Engineering:** Develop products where texture contributes significantly to satisfaction, reducing the sole reliance on sweetness.

### - **Regional Specialization:**

Innovate within traditional Indian sweets to offer healthier versions, preserving cultural authenticity while meeting modern demands (e.g., jaggery-based

## Sources:

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- Intel's 2023 Global Food and Drink Trend Unguilty Pleasure (for unguilty pleasures trend).

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# MILK- NEED & CONCERNS

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Milk is one of the top most component of Panchamrut, described in Indian Traditional Knowledge symbolizing purity, bliss, and immortality. To the new born, human or animal, mother's milk is life which helps the baby develop in a healthy adult. The milk provides basic nutrition and a living, protective system of antibodies, enzymes, hormones, and beneficial bacteria. The most important components include immunoglobulins that help protect against infection, stem cells, white blood cells, and prebiotics that build a healthy gut, immune system and cognitive growth. As the day's pass, milk undergoes significant changes, transitioning from highly concentrated colostrum to a more

dilute "transition milk" and eventually to consistent mature milk that provides sustenance for growth to babies.

### The Need

Besides children, the adolescent and adult population also needs milk as it is a highly nutritious beverage rich in calcium, vitamin D, and protein, providing key health benefits such as improved bone density, muscle repair, and cardiovascular support. The vegetarian population is dependent on milk for its high-quality protein source. Approximately 38% to 39% of the Indian population identifies as vegetarian, making it the country with the highest rate of vegetarianism globally.

While estimates vary, roughly 20-40% of Indians are strictly vegetarian, with a significant majority limiting meat consumption, often based on religion,

culture, or region. Among the 60% population which is identified as non-vegetarians, studies suggest that roughly 70-78% of people consume non-veg food in limited quantities or infrequently. Hence, large population is not consuming the required quantity of protein in their diet. The plant based proteins are needed in large quantities because of its low digestibility and need for combination source for making it complete protein.

Milk proteins being high quality, easy digestible source of protein India ranks 1st in milk producer, with total production reaching almost 240 million tonnes in 2023-24, growing at a 5.7% annual rate. Per capita availability has increased to over



471 grams/day. As a vital protein source, milk constitutes a central nutritional component in Indian diets

### Concerns:

While the milk being such a good source of nutrition and growth, we come across many warning signals if the milk quality is not preserved from farming, production, processing and logistics till it reached the consumer. In the milk farming practices, various chemicals are used for its advantage in improving production, maintaining quality and avoiding contamination in handling. However, if the methods are not used as per scientific advice and standard practices, the milk can become a carrier of many unwanted chemicals which can harm the health of consumers.

In last few decades, food and dairy analysis has improved significantly. The latest food analysis is focusing on rapid, non-destructive techniques, leveraging AI-driven data analysis. Major advancements include

enhanced mass spectrometry and chromatography, biosensors for contaminants, and spectroscopic methods (NMR, Raman, NIR). These methods improve accuracy, reduce

detection times, and ensure food authenticity.

These Improved analytical methods that allow detection of exquisitely low concentrations of chemicals have revealed that milk and dairy products may be contaminated with a wide range of potentially harmful chemicals. These compounds enter milk through various direct and/or indirect routes. Although their occurrence in milk is difficult to avoid, quality system interventions at various check points has resulted in control of these chemical ensuring safety of milk for human consumption. In the light of continuous development and industrialization, controlling the chemical contamination is priority for any regulator.

### Misconception:

Fear of milk contamination may give rise to misconception that meat and poultry are better & safe protein source options, since their risk issues are not so widely discussed in electronic or social media. It is important to note that

the concerns of chemical contamination are not specific to milk, they are of equal concern in meat and poultry. Studies indicate significant chemical contamination in Indian meat and poultry, primarily driven by antibiotic residues and heavy metals.

Research shows over 40% of chicken samples in certain regions contain antibiotic residues (enrofloxacin, tetracycline), while ready-to-eat chicken often carries heavy metals like nickel and lead. These residues, often entering via contaminated feed, present long-term health risks and antimicrobial resistance (AMR) concerns.

Chemicals that contaminate liquid milk through animal feed & water they drink

### 1. Pesticide Residues

Spraying pesticides, Insecticides, herbicides on crops to protect them from insects, diseases, and weeds, is normal practice. These sprays ensuring higher yields and better quality produce as chemicals by preventing the loss of 20-40% of global crop production, safeguarding against pests that destroy plants and reducing competition for nutrients. Pesticides also prevent insect pest contamination of grains and agri-produce which enable efficient large-scale production and storage.



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- Oil seed, oils and its products
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- Food additives, preservatives and artificial sweeteners
- Synthetic food colour
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- Drinking water as per IS 10500
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These chemicals used in farming contaminate liquid milk through animal feed (fodder, silage and concentrates). These contaminants are ingested by dairy animals and, due to their lipophilic (fat-loving) nature, are often stored in fat tissues and excreted through milk fat. The primary chemical groups that find their way into liquid milk via feed are Organochlorine Pesticides (OCPs), Pyrethroids and Organophosphates (OPPs).

## 2. Mycotoxins

These are toxic compounds produced by moulds that grow on animal feed (especially silage, corn, and grains) stored in poor conditions. One such very common toxin is Aflatoxin M1 (AFM1). This is the hydroxylated metabolite of Aflatoxin B1. When cows consume feed contaminated with Aflatoxin B1, the toxin is converted to AFM1 and secreted into the milk.

## 3. Heavy Metals

Contaminated soil, water, or fertilizer can introduce heavy metals into the feed, which are then absorbed by the animal. These are commonly Lead (Pb),

Cadmium (Cd) and Mercury (Hg)

## 4. Veterinary Drugs & Growth Promoters

While these are often given directly to the animal, they are also considered part of the feed

management contamination (if in medicated feed).

These include Antibiotics:

Such as  $\beta$ -lactams, tetracyclines, and fluoroquinolones:

Hormones: Synthetic hormones like recombinant bovine growth hormone (rBGH) used to increase milk output and Antiparasitic agents used for controlling ticks or worms on animals.

## 5. Adulterants and Additives in Formulated Feeds

These are sometimes intentionally added to feed to artificially boost protein content or arise from contaminated packaging materials. Cyanuric acid and nitrogen-rich compounds like melamine (often mistaken for or mixed with cyanuric acid) are added to animal feed to falsely inflate apparent protein content. Because standard protein tests (Kjeldahl method) measure nitrogen rather than true protein, adding these compounds makes low-quality feed appear higher in protein value.

## 6. Oxytocin Hormone

Oxytocin is a naturally occurring hormone in milk,

essential for milk let-down during lactation. While natural levels are low, synthetic oxytocin is illegally misused by some dairy farmers to milk cattle to increase milk yield in spite of very strict regulation on use of oxytocin. Although there is no reported evidence, it is widely presumed that long term consumption of such milk leads to adverse health consequences. The results of the study demonstrate that OT is a natural constituent of milk and injection of exogenous OT for milk let down has no effect on its milk content. {Indian J Med Res. 2014 Jun;139(6):933-939}

The government has two pronged approach to control the contaminants in milk & milk products.

### A. Veterinary & Animal Feed Safety Practices to Prevent Contamination in Milk

Animal feed production is undergoing a shift in approach to food safety, with preventive measures to address possible hazards before they occur. Indian regulations for feed safety to prevent milk contamination are primarily governed by the Food Safety and Standards Authority of India (FSSAI), focusing on limiting contaminants like aflatoxins, heavy metals, and pesticide residues in feed to ensure food safety.

Key measures include 12-point action plans, strict hygiene on dairy farms, and mandated surveillance to prevent contamination.

Key legal frameworks and regulatory approaches include The Insecticides Act, 1968 where Central Insecticides Board & Registration Committee (CIB&RC) approves pesticides, specifies their usage, and sets safety measures, Insecticide Rules, 1971 which specify the labelling of pesticides, requiring them to indicate if they are for agricultural or household use, and mandate specific precautions to prevent hazardous usage.

In India, the use of oxytocin in milking animals is strictly regulated and its misuse is banned under the Drugs and Cosmetics Act. It is illegal to use, sell, or distribute oxytocin for livestock to increase milk production, which is considered a form of animal cruelty that causes painful side effects like mastitis and reduced fertility.

### Impact of Regulations on Pesticide residue

Significant impact of the regulation is noticed in few of the studies on residue levels. The proportion of a-HCH of the total HCH in milk also decreased over the

years (Surendra Nath et al. 2002). This could be the result of the restriction imposed on the sale of HCH with less than 99% of the active ingredient, the g-isomer. The reduction in DDT contamination was much more marked, presumably because of the ban imposed on its use for agricultural purposes. The mean concentration of DDT in the milk fat collected during 1998-99 was 0.11 ppm, a value much lower than the MRL. Very little or no DDT as such was detected in most of the samples analysed. Cows start excreting the DDT and DDD through their milk within 24 hr of the ingestion of the pesticide through feed (Surendra Nath et al. 2000 b). The observation of Unnikrishnan et al. (1999) that DDT was present only in traces in most of the milk supplies indicated that the animals were not being subjected to fresh ingestion of DDT.

The dietary risk assessment of pesticides under two scenarios i.e. lower-bound scenario (LB) and upper-bound (UB) revealed that daily intake of pesticides was substantially below the prescribed acceptable daily intake except for fipronil in children at UB. (JPS Gill & Others/www.nature.com/scientific reports 2020.)

## B. Food Safety & Standards Act, 2006 (FSSAI):

This act sets tolerance limits for pesticide residues in food, including food derived from animals (milk, meat) that might have consumed contaminated fodder.

Under ISO 22000:2018 and Food Safety Management Systems (FSMS), all chemical contaminants like Pesticide Residue, Heavy Metals, Aflatoxin, contamination are treated as a chemical hazard requiring compliance with legal maximum residue limits (MRLs). Rules mandate establishing proactive procedures (PRPs), conducting risk assessments via Hazard Analysis (HACCP), and enforcing supplier management to ensure residues are below safe levels. The system must trace raw materials back to their source (e.g., agricultural field/farm) to enable action if high residue levels are detected.

Since FSSAI Regulation mandates ISO:22000 certification to all FSSAI Licence holders, the consumers can be rest assured of quality of milk & milk products marketed by organised sector.

# ULTRA-PROCESSED FOOD (UPF) – WHERE DO WE GO FROM HERE?



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What is food? The Merriam Webster dictionary defines food as follows: Food is any nutritious substance—primarily composed of carbohydrates, fats, and proteins—consumed by organisms to sustain life, provide energy, and promote growth. It represents essential sustenance and, for humans, often signifies culture, family, and pleasure. Common synonyms include nourishment, fare,

provisions, nutriment, sustenance, and diet.

But what about processed food? The NHS in the UK has defined processed food as follows: Processed food is any food or drink altered from its natural state, ranging from minimally processed (washed, frozen, or pasteurized) to heavily altered. Processing is used for safety, convenience, and preservation. It covers a spectrum from simple canned goods and fresh bread to ultra-processed foods high in added sugar, fat, and preservatives.

Food processing has existed from time immemorial. Fire was used to make meat tender, although that idea

itself may have come from consuming animals or birds killed by forest fire. The softening of tough meat and fibrous plants are thought to be the earliest form of food processing. However, the focus changed to preservation of food and thus early preservation methods such as drying, smoking, curing, pickling, canning and salting were identified and adopted across many cultures.

Since most of the global population did not have enough to eat till very recently, obesity was not widely prevalent in most cultures. In fact, obesity was often related to opulence and wealth, and was considered as a virtue.

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Ultra Processed Food (UPF) - Where do we go from here?



While a few Greek physicians had indeed warned that obesity could be dangerous, it was never taken to be a serious issue, unlike malnutrition and deficiency diseases. By 1930, however, the international medical profession started to mention obesity as a major health problem. The World Health Organization listed obesity as a disease in the International Classification of diseases in 1948, and it was officially classified as a chronic disease requiring management only in 1997. Finally, the American Medical Association (AMA) recognized obesity as a disease in June 2013.

Thus, obesity became one of the first diseases to be associated with food consumption. Other diseases began to appear in the list, and today, over 200 diseases are associated with food consumption, including diabetes and cancer. It is in this light, the term ultra-processed food was coined by the Centre for Epidemiological Studies in Health and Nutrition at the University of Sao Paulo in Brazil in 2020. Rather than only focussing on the

nutrient content while trying to understand the relationship between food and health, this study proposed a classification, called Nova Classification which classified foods into four groups. The Nova Classification emphasises on the extent as well as the purpose of the processing. The four groups can be summarised as:

**Unprocessed or minimally processed food**

**Processed culinary ingredients**

**Processed food**

**Ultra-processed food and drinks**

For those readers who are interested to understand this classification, please refer to <https://nupens.fsp.usp.br/en/food-classification-nova/>, and in particular to the video within this article.

This study has led to a wide debate and discussion, particularly in the US and in the UK, so much so, there are by now, multiple definitions of this terminology across the world. While the Nova classification attempts to classify certain products as UPF by giving a lengthy and winding definition as can be seen in the above document, the British Heart

Foundation has a very specific definition as follows: Ultra-processed foods typically have more than 1 ingredient that you never or rarely find in a kitchen. They also tend to include many additives and ingredients that are not typically used in home cooking, such as preservatives, emulsifiers, sweeteners, and artificial colours and flavours. These foods generally have a long shelf life.

Currently, this area is turning out to be a mine field with numerous definitions, arguments and counter-arguments. An article published in the Cambridge University Press in August 2025 (<https://www.cambridge.org/core/journals/proceedings-of-the-nutrition-society/article/are-all-ultraprocessed-foods-bad-a-critical-review-of-the-nova-classification-system/16D07B81A1587340B3EE847F3C662E60>) argues that the simple binary distinction between processed foods and ultra-processed foods is not very helpful.

So what is the way ahead? UPF has certainly started a huge debate about how the consumption of SOME processed foods (defined vaguely as UPF) can have an impact on human health. It has by now become known to many consumers,



Ultra Processed Food (UPF) - Where do we go from here?

particularly in the US, but also across the world. The food industry should not try and defend itself on this issue. Given the relatively low credibility that the food industry has in the West, it will be counter-productive to try and defame this concept. Instead, the food industry needs to start a dialogue in an open and transparent manner. There are many issues that the food industry can communicate to the consumers - the need to consume a balanced and varied food, the joy of consuming tasty and good food, the need for children to be mindful of their food and exercise, and many other relevant subjects that consumers need to be aware of.

If the Indian food industry is not proactive on this issue, the government may start to play an active role as the FSSAI did in 2018 with its **Eat Right India** campaign.

In France, food advertisements are legally required to display health warnings, with "**Pour votre**

**santé, évitez de grignoter entre les repas**" (*For your health, avoid snacking between meals*) being one of the most prominent. Mandatory since 2007, these messages aim to curb obesity by encouraging three structured meals, typically featuring on TV, radio, and print ads. There are other messages such as:

**"Pour votre santé, mangez au moins cinq fruits et légumes par jour."** (*For your health, eat at least five fruits and vegetables a day.*)

**"Pour votre santé, pratiquez une activité physique régulière."** (*For your health, exercise regularly.*)

**"Pour votre santé, évitez de manger trop gras, trop sucré, trop salé."** (*For your health, avoid eating too many foods that are high in fat, sugar or salt.*)

In parallel, the food industry should re-examine the various products and start to reformulate to

reduce each of salt, sugar and fat used in the process. The industry should inform consumers about the dangers of over-consumption as well as about the selection of food on a daily basis, without compromising on taste and fun that food provides us every day. Mixing up 'clean label' considerations regarding additives, etc. in the subject of UPF is not very helpful, and the food industry should once again educate the consumers regarding the use of additives for food preservation and performance without impacting on human health.

There are no easy solutions, but at the same time, the food industry should not ignore this threat and come out with specific proactive strategies.



# ENZYME BASED BIOCONVERSIONS FOR PRODUCTION OF PREBIOTICS



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## Introduction

The term “prebiotic” was first formally introduced in 1995 and defined as “a nondigestible food ingredient that beneficially affects the host by selectively stimulating the growth and/or activity of one or a limited number of bacterial species already resident in the colon, and thus attempts to improve host health.” Prebiotics primarily consist of non-digestible carbohydrate compounds, particularly oligosaccharides, that selectively stimulate beneficial gut microbiota. Other prebiotics include polyphenols. (1)

The global prebiotics market, estimated at \$6 billion in 2022, is forecast to reach a revised size of \$13.8 billion by 2030, growing at a CAGR (compound annual growth rate) of 11% over the analysis period of 2022-2030. (2)

Prebiotics stimulate the growth of beneficial bacteria, mainly Lactobacillus and Bifidobacterium, improving gut integrity and function. Gut microbiota ferments prebiotics to short-chain fatty acids (SCFAs), which have been related to the improvement of several physiological effects such as improved nutrient absorption, better gut health, enhanced immunity

and reduction in inflammation.

In recent times, the range of compounds classified as prebiotics has expanded beyond the “established prebiotics” (inulin and galacto- and fructo-oligosaccharides (GOS and FOS, respectively)) to “emerging prebiotics”, comprising new carbohydrate-based molecules such as xylo-oligosaccharides (XOS), isomalto-oligosaccharides (IMO), pectin oligosaccharides (POS), manno-oligosaccharides (MOS), chitin oligosaccharides (CHOS), Human milk oligosaccharides (HMOS) (1).

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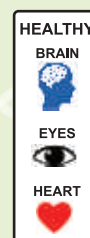
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## Sources of Prebiotics

Prebiotics naturally exist in different dietary food products, including asparagus, sugar beet, garlic, chicory, onion, Jerusalem artichoke, wheat, honey, banana, barley, tomato, rye, soybean, human's and cow's milk, peas, beans, etc., and recently, seaweeds and microalgae. Raw oats, unrefined barley, yacon and wholegrain breakfast cereals are some foods which are classified as prebiotic fibre sources. For example, oats and barley have high amounts of beta-glucans, fruit and berries contain pectins, seeds contain gums, onions are rich in inulin and oligofructose, and bananas and legumes contain resistant starch.

## Production of Prebiotics

Because of their low concentration in foods, prebiotics are manufactured in large scale using conversion or extraction processes. Prebiotics such as inulin, fructo-oligosaccharides (FOS), and galacto-oligosaccharides (GOS) can be extracted from natural plant sources like chicory root, garlic, onions, and Jerusalem

artichoke. Key extraction methods include water extraction (e.g. extraction of inulin from chicory and Jerusalem

artichoke), ethanol precipitation, (e.g. extraction of xylan and pectin from treated vegetable material) and chemical-thermal treatment (e.g., treatment of asparagus and kale at 121°C with 3 % (w/v) gluconic acid) (3).

Oligosaccharides, can be produced either via the top-down approach (hydrolysis of the parent polysaccharides to oligosaccharides) or bottom-up approach (synthesis of oligosaccharides from simple sugars) (Fig 1). The first approach makes it possible to produce these molecules from different sources by hydrolysis, such as inulin from chicory roots, (Fig.1) (2) and waste from the agri-food or marine industry, lignocellulosic waste, seaweeds, and crustacean waste. In these cases, the production of carbohydrates involves treatment with strong acids, whereas the use of enzymes allows their preparation in aqueous media under mild conditions, and therefore a higher degree of purity with respect to other by-products (2).

Some of the prebiotics are

produced by fermentation using lactose, sucrose, and starch as raw material. The production of prebiotics through the fermentation of carbohydrates involves using microorganisms to convert simple sugars or complex carbohydrates into non-digestible oligosaccharides, such as fructo-oligosaccharides (FOS) (Fig 1) and galacto-oligosaccharides (GOS). For example, sucrose is fermented by microorganisms such as *Aspergillus* and *Aureobasidium* species to produce fructo-oligosaccharides, lactose is fermented by microorganisms like *Lactobacillus*, *Kluyveromyces*, and *Aspergillus* to produce galacto-oligosaccharides. The process involves fermentation and subsequent separation of the cells and purification of the prebiotics. Microorganisms produce enzymes which catalyse transglycosylation reactions for the production of prebiotics.

## Enzymatic synthesis of prebiotics

Enzymatic processes have emerged as powerful tools for generating these prebiotics with high selectivity under mild conditions, reusability and efficient separation of the prebiotics from the system.

The enzymatic hydrolysis of polysaccharides serves a dual purpose in the production of prebiotics.

It not only facilitates oligosaccharide generation but also acts as a tool for breaking down the cell wall in plants, enhancing the extraction of phenolic compounds, another class of emerging prebiotics, through a green method commonly known as enzyme-aided or enzyme-assisted extraction.

Several issues such as final overall yield of products, waste production, number of synthetic steps (based on production and purification steps) can be improved using enzymes as catalysts.

The extraordinary selectivity and specificity of enzymes (particularly, glycosidic bond enzymes) allow these molecules to be obtained in one or a few synthesis steps in aqueous media at moderate temperature, also with high versatility, enabling the same enzyme to be used in several processes. One example is the synthesis of a hexamer-oligosaccharide.

The product was synthesized in 94% overall yield using glycosyltransferases (in four enzymatic steps by using cofactor-recycling), whereas the chemical approach required multiple

glycosylation steps (with a high number of previous synthesized building blocks prepared), giving a final overall yield of 2.6% (2).

Thus, a large number of enzymatic glycosylation processes has been studied, in which, in addition to taking advantage of their excellent natural properties, strategies have been applied to improve them by increasing their stability under the reaction conditions or their versatility in recognizing other similar substrates, for example through protein engineering, or by improving their properties and recyclability, thus improving the economic sustainability of the process, which is of industrial interest. Newer substrates are being studied for bioconversion into prebiotics for example; GOS production from whey permeate.

Currently, GOS, FOS and lactulose are the carbohydrates with prebiotic activity confirmed by clinical studies. However, with the expanded definition of prebiotics, there is a growing demand for the identification, production and evaluation of new prebiotic

carbohydrates that can affect the broader range of beneficial microorganisms and targeted hosts. These compounds, such as XOS, POS, MOS, IMO and HMOS, are known as “emerging” prebiotics. The composition of the oligosaccharides, the enzyme involved in synthesis and spectrum of probiotics that grow are listed in table 1 (4).

Phenolic compounds have multiple health benefits due to their various biological activities such as antioxidant and anti-inflammatory activities and in recent times have been recognized as prebiotics.

Some studies have shown that they uniquely support the growth of beneficial commensal microorganisms, while inhibiting the growth of pathogens. Many such compounds are not only within cytosolic spaces of plant cells but are also bound within plant cellular walls. Examples of sources are berry extracts, green tea extracts etc.





the optimal use of raw materials and fine-tuning the physiological activity of prebiotics. These green catalysts are employed to produce prebiotic oligosaccharides

and enhance the extraction and structural modification of polyphenolic prebiotics. Enzyme technology is important for extraction of prebiotics from agrifood byproducts and wastes, in alignment with the principles of the circular economy. Advances in this area include immobilization of the enzymes, conversion from batch to continuous reactor systems and genetic modification of the enzyme production microbe for improved and efficient bioconversion

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Enzyme-assisted extraction methods are currently one of the few types of methods capable of achieving maximum yield under mild reaction conditions (5). One of the polyphenols most thoroughly examined as a potential prebiotic is quercetin. Several animal and in vitro studies found that quercetin had a positive effect on the intestinal microbiota composition. It is widely distributed in various fruits, vegetables, grains and leaves, usually as glycoside derivatives, and hence - glucosidase-based modification processes have been applied for obtaining this compound (2).

#### Summary:

Efficient enzymatic processes are essential for



# OLEORESINS OF SPICES: FLAVOUR IN ITS PUREST FORM

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Much of the flavour in modern processed foods is concentrated and preserved in forms that often go unnoticed; oleoresins are a key example. Oleoresins are concentrated extracts obtained from spices, herbs, and other plant materials, containing the complete range of flavour, aroma, colour compounds present in the original source.

Unlike essential oils, which mainly capture volatile compounds, oleoresins include both volatile and non-volatile components, providing a complete sensory profile. This combination of all the compounds, including essential oils, pigments,

antioxidants, etc., makes oleoresins highly useful as functional ingredients in food processing. The name is self-explanatory; oleo means oil, and resin refers to the semi-solid resinous compounds. Oleoresins can be extracted from various plant parts, including fruits, seeds, rhizomes, and roots. While they also find applications in pharmaceuticals and cosmetics, in the food industry, spice and herb oleoresins are widely used as flavouring and colouring agents.

Oleoresins are typically liquid, though some may be viscous and paste-like. They are usually diluted before use, blended with a solubilising medium such as vegetable oil. For easier handling and application,

oleoresins can be converted into powder form by coating the extract onto carrier materials such as salt or dextrose. This improves stability and enables controlled flavour release in food systems (1).

India is one of the largest producers and exporters of spice oleoresins. The oleoresin market size is forecast to reach USD 2.54 billion by 2031 at 6.02% CAGR over 2026-2031. The main spice oleoresins/oils produced and exported from India are pepper, ginger, cardamom, chilli, turmeric, etc. The USA, Canada and Western Europe are the major markets (2,3).



### •Extraction and Production -

Spice oleoresins are typically produced by extracting both the volatile and non-volatile fractions of spices in a controlled, multi-step process. In some processing approaches, essential oils may be separated by distillation and later recombined; however, in many cases, oleoresins are obtained directly through solvent extraction. The extraction is carried out using permitted food-grade solvents such as acetone and ethyl acetate, which dissolve both non-volatile constituents and residual volatile components. This step may be repeated to ensure maximum recovery. The solvent is then removed to obtain a concentrated resin, which may be standardised or blended to achieve the desired sensory profile. Extraction conditions such as solvent type, temperature, and duration are optimized depending on the raw material. As per the specifications of the Food Safety and Standards

Authority of India, a defined list of permitted solvents is provided along with their residual limits. Spice oleoresins are standardised based on their key active compounds, such as piperine, thymol, and curcuminoids, as

well as minimum volatile oil content to ensure consistent quality and performance. In certain cases, additional quality parameters are specified, including colour value and Scoville Heat Units (SHU), which indicate the intensity of colour and pungency in the extract. More recently, supercritical CO<sub>2</sub> extraction has emerged as an alternative technique that avoids solvent residues and can yield oleoresins with efficiency, although at a higher cost (4,5).

### •Common examples -

**Paprika oleoresin** is obtained from the dried ripe fruits of *Capsicum annum L.* It is a viscous, reddish-brown liquid, primarily oil-soluble, and valued for its intense red colour derived from carotenoid pigments such as capsanthin, with negligible pungency. It is widely used as a colouring and flavouring agent in the food industry; it also contributes antioxidant properties that support product stability and shelf life. It has a mild sweet-

chilli aroma. The oleoresin blends well with oils and other food ingredients (e.g., salt, sugar, lecithin), with approximately 1 kg equivalent to 12-15 kg of paprika powder with regard to colour intensity.

**Black pepper oleoresin** is a concentrated extract obtained from the dried berries of *Piper nigrum L.* It is typically a dark green to olive liquid and represents the full flavour profile of black pepper. The oleoresin contains both volatile and non-volatile constituents, including essential oil fractions (rich in terpenes and sesquiterpenes) and pungent alkaloids such as piperine and chavicine, which are responsible for its characteristic sharp, peppery taste. Black pepper oleoresin is consumed globally in over 18,000 metric tons. It is heavily used in savoury food items and meat processing. Over 65% of black pepper oleoresin comes from India and Vietnam.

**Turmeric oleoresin** is a concentrated extract obtained from the dried rhizomes of *Curcuma longa.* It is an orange-yellow to reddish-brown homogeneous liquid or paste containing both volatile and non-volatile constituents, including compounds such as turmerone and zingiberene, and curcuminoids (primarily curcumin), which impart its

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characteristic colour. It has a mild earthy aroma, musky notes, slightly bitter taste, and antioxidant and anti-inflammatory properties. It can be easily blended with dry ingredients (e.g., salt, dextrose) and has a concentration of approximately 1 kg equivalent to 60 kg of turmeric powder.

**Ginger oleoresin** is a concentrated extract obtained from the dried rhizomes of *Zingiber officinale*. It is a dark brown, liquid and contains both volatile oils and non-volatile compounds, including gingerols and shogaols, which impart its characteristic warm aroma and sharp, biting pungency.

**Capsicum oleoresin** is a concentrated extract obtained from the dried ripe fruits of *Capsicum annum* L. or *Capsicum frutescens* L. It is a viscous, reddish-brown liquid. It contains capsaicinoids, particularly capsaicin, as the principal bioactive compounds responsible for its intense pungency and heat

sensation. It exhibits a characteristic, sharp, spicy aroma. It blends well with carriers such as oils, salt, dextrose, or lecithin, and is highly concentrated

(approximately 1 kg equivalent to 100 kg of raw chillies) (6,7).

Beyond these, numerous spice and herb oleoresins are commercially available, including deodorised or decolourised variants tailored to specific application needs.

#### • Applications and usage -

**Processed meats** - Spices such as pepper, capsicum, ginger, and nutmeg have traditionally been used in meat products to enhance flavour and preservation. In modern large-scale processing, these are increasingly replaced by oleoresins, which offer consistent quality, easier handling, and cost efficiency. Typically, these spices are incorporated as oleoresins, while cardamom and coriander are often used as essential oils.

#### **Fish and vegetables** -

Oleoresins are widely used in seasoning mixes for fish and vegetable products, especially pickled or brined items. These simplify

formulation, reduce handling complexities, and improve process efficiency.

**Soups, sauces, chutneys, and dressings** - With the rise of convenience foods, oleoresins often in dispersed or encapsulated forms are preferred in dry mixes for easy reconstitution. Common examples include celery, pepper, and capsicum oleoresins, combined with onion and garlic oils, while coriander and ginger extracts are used in products like barbecue sauces.

**Baked goods** - The baking industry has steadily shifted from whole spices to oleoresins of ginger, cinnamon, and nutmeg due to their ease of handling and uniform flavour delivery. Their use is expanding in biscuits, cake fillings, and snack products.

**Confectionery** - Although less common, spice extracts are being explored in confectionery, including chocolates and toffees, offering novel and appealing flavour profiles.

**Snacks** - Snack seasonings often require surface application through spraying or dusting. Oleoresins of pepper, chilli, and celery are widely used for flavour, while turmeric and chilli extracts contribute colour, ensuring uniform coating and intensity (8).

### •Advantages and Recent Trends -

Oleoresins can replace whole/ground spices without significantly compromising on any flavour and aroma characteristics. Spice oleoresins ensure consistent quality of flavour and aroma. The quality of an oleoresin is typically evaluated based on the presence of the active ingredients at desired levels.

Their use in food and beverage products provides several advantages. Being highly concentrated, oleoresins deliver strong flavour and colour even at low usage levels, making them cost-effective. As they are derived from natural plant sources, they also align well with the growing consumer preference for clean-label ingredients. In addition, oleoresins exhibit excellent stability, maintaining their sensory properties under high temperatures and varied processing conditions, which supports consistent product quality and longer shelf life.

Emerging extraction technologies such as microwave-assisted, enzyme-assisted, and ultrasound-assisted extraction are gaining

attention for their improved efficiency and precision.

Compared to conventional methods, these techniques often enable higher yields, reduced solvent use, shorter processing times, and better preservation of heat-sensitive compounds, resulting in more sustainable and high-quality extracts (9).

### Conclusion -

Oleoresins have become valuable ingredients in modern food systems, offering consistent flavour and colour in a stable and easy-to-use form. Beyond their sensory role, they also carry bioactive compounds, and advancements in extraction technologies are improving their functionality and sustainability. As manufacturers move away from synthetic additives and seek ingredient transparency, oleoresins support cleaner-label formulations, a natural, standardised alternative that aligns with both regulatory expectations and consumer perception. Overall, they represent a balanced combination of innovation and sustainability, making them increasingly relevant in the development of high-quality food products.

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# SHATAVARI: FROM AYURVEDA TO MODERN FOOD INNOVATION



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Shatavari (*Asparagus Racemosus*) is a traditional herb that is frequently referred to as the "Queen of Herbs." It is native to India and the Himalayas, and is a perennial herb. It has medicinal qualities with a history of use spanning thousands of years for promoting vitality, longevity, female fertility, and overall health (1). With the rising demand for plant-based, functional, and Ayurvedic ingredients in modern nutrition, traditional botanicals are being re-examined through a scientific and industrial perspective. Likewise, Shatavari has been studied for its growing applicability in nutraceutical and functional food systems.

## Shatavari Nutritional

**Value:** The nutritional composition of Shatavari can vary based on source, processing methods, and drying methods. Shatavari is not consumed for its macronutrient contribution but rather for its bioactive compounds that drive its functional and therapeutic properties.

**Key Bioactive Compounds include:**

- **Steroidal saponins (Shatavarins):** Primary active compounds linked to hormonal modulation
- **Flavonoids and polyphenols:** Antioxidant activity
- **Alkaloids:** Therapeutic effects
- **Fructo-oligosaccharides (FOS):** Prebiotic properties supporting gut health
- **Other compounds:** Racemofuran, racemosol, asparagamine A

## Potential Health Benefits:

**1. Hormonal Balance for Women-** Shatavari is known for its support of the female reproductive system and is traditionally used to enhance fertility, regulate menstrual cycles, reduce menopausal symptoms, and promote healthy lactation. Research indicates that Shatavari may play a role in regulating hormonal balance and addressing reproductive health issues such as hormonal imbalances and PCOS. Shatavarins contribute to their therapeutic effects. Its phytoestrogenic properties enable it to mimic oestrogen-like activity, which may help manage hormonal fluctuations (2).

**2. Antioxidant and Anti-inflammatory Effects-** Shatavari exhibits

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Get the best of protein nutrition for better performance and health

### AFTER AIR CLASSIFICATION

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The smartest way to consume the goodness of Amaranth protein

### AFTER AIR CLASSIFICATION

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## Rice

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- Starch Fraction 17.69%



## Kala Chana (Horse gram)

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- Starch Fraction 13.93%



## Rajma (Kidney Beans)

The perfect plant-based protein source

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- Protein Fraction 46.07%
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significant antioxidant activity, helping combat oxidative stress and cellular damage. Racemofuran demonstrate anti-inflammatory effects comparable to COX-2 inhibition, without harming the digestive system. These properties support its potential role in managing chronic inflammation-related conditions (3).

**3. Adaptogen:** Shatavari is an adaptogenic herb that helps the body manage physical and emotional stress. It supports the regulation of body systems and improves stress resistance. Research by Velavan et al. demonstrated its adaptogenic and nootropic effects in mice, suggesting it may help in reducing stress-induced anxiety and depression, as well as improving sleep quality (4), (5).

**4. Digestive Health-** Shatavari contains inulin-type fructo-oligosaccharides (FOS), which act as prebiotics. These help nourish beneficial gut bacteria like Lactobacillus and Bifidobacterium and promote the production of short-chain fatty acids

(SCFAs), which can reduce inflammation. It also has soothing and cooling properties that help protect the stomach lining and support gut health. Shatavari has traditionally

been used to treat digestive disorders such as ulcers, acid reflux, diarrhoea, dyspepsia, stomach inflammation, etc.

**5. Potential Benefits for Mental Health:** Shatavari helps lower inflammation in the brain by suppressing pro-inflammatory cytokines, supports the hypothalamic-pituitary-adrenal (HPA) axis, restores neurotransmitter balance, and helps in the formation of new neurons in important brain areas. These benefits show Shatavari as a natural aide for mood regulation during stressful situations (6). Along with this, High-Performance Thin-Layer Chromatography (HPTLC) studies show that dry Shatavari root is richer in beneficial compounds, like steroidal saponins and flavonoids, compared to its wet form, which may influence both gut and brain health.

**Safe daily amount & Side-effects of over-consumption:**

There is no universally fixed dosage for Shatavari, as it depends on the form, concentration, and

individual health status and medical condition. Traditionally, its roots were processed into powders, decoctions, and medicated ghee, often consumed with milk to enhance bioavailability.

Over-consumption of Shatavari is not common. If it happens, then it may lead to mild to moderate side effects such as digestive discomfort due to its natural laxative properties. Hormonal balance may also be disrupted due to its phytoestrogenic activity, particularly in individuals with hormone-sensitive conditions.

Beyond its therapeutic benefits, Shatavari is now making its way into food systems. Various forms of Shatavari, like root powder, tablets and capsules, granules, syrups, and oils, are available in the market.

Today, as consumers are becoming more health-conscious, the knowledge of nutrition among the general population is increasing. This has led to the development of foods meeting specific nutritional requirements for better immunity and health. One way to deliver a specific health benefit is the use of beneficial ingredients in existing food products. By this, a conventional food could be transformed into a functional food.

## Application of Shatavari in Food Formulation:

By incorporating Shatavari into existing food products, traditional foods can become functional foods, enriched with nutritional plant-based components while maintaining their original flavours.

In **functional beverages**, Shatavari can be added to herbal drinks/teas and plant-based milks. Its adaptogenic and hormone-supportive properties make it suitable for women-focused and stress-relief formulations.

A recent experiment involving a nutraceutical health beverage containing Shatavari demonstrated its potential as a valuable addition to the functional beverage industry, providing a natural approach to supporting women's reproductive health safely and effectively (7).

Typically, 0.5 to 2% of Shatavari powder is added to products. However, its sensory profile can present challenges due to its inherent bitterness and earthy taste. To enhance mouthfeel and overall consumer experience, strategies such as pairing with sweeteners, incorporating natural flavours, or utilizing encapsulation techniques can be applied.



In **dairy and dairy-alternative products**, Shatavari powder can be blended into products such as yoghurt, flavoured milk, ghee-based formulations, and plant-based dairy alternatives.

The study on milk fortified with freeze-dried shatavari extract (1%) showed significant immunomodulatory and antioxidative effects in mice due to its saponin, glycoside, polyphenol, and flavonoid content, indicating its role against free radical-related diseases (8).

Even traditional applications like Shatavari-infused milk or ghrīta can be modernized into ready-to-consume formats, and fat content in dairy can enhance the bioavailability of Shatavari's active compounds.

For **bakery and snack products**, Shatavari can be incorporated into nutrition

bars, biscuits, breads, and traditional Indian snacks like laddoos. It enhances the functional value of these products, especially when combined with other ingredients such as ghee, millets, nuts, and seeds.

One example: Dried Shatavari roots were added to the bread dough. The roots were broken into small pieces and exposed to 60 °C for 2 h before being powdered in a domestic mixer. Post-analysis, it was found that all the phytochemicals, such as alkaloids, steroids, terpenoids, and saponins, present in the original herbs were also present in the bread.

However, flavonoids were not found in the bread due to loss during baking. Compared with market bread, the texture required improvement (9). The texture can be improved with the addition of fats or hydrocolloids.



In a study, Shatavari, ashwagandha, and Yastimadhu were added to refined flour in biscuit production. Biscuits with 3% of each powder showed a nutritional composition of 65% carbohydrates, 25% fat, 7% protein, and 0.68% fibre, particularly Shatavari powder biscuits containing high water-soluble minerals. These biscuits were positively received for their affordability and health benefits. During baking, bioactive components remained intact. Shelf-life studies indicated increased moisture content and minimal microbial growth (10).

In the **health supplement category**, Shatavari is widely used in powdered drink mixes, herbal tonics, protein blends, and health syrups. It can also be used in formulations for clinical and specialized nutrition, like maternal health, postpartum nutrition,

elderly nutrition, and gut health, given its numerous health benefits.

**Formulation consideration:** From a formulation standpoint, turning these benefits into products requires focus on aspects like taste masking (due to slight bitterness), optimal safe dosage levels, compatibility with other ingredients present in the product, stability during processing, bioavailability and absorption. Here, techniques such as microencapsulation, mixing with natural sweeteners, or combining with complementary herbs can enhance its acceptability.

### **Market Potential:**

There are a few products available in the Indian market that have Shatavari as one of their main ingredients. Understanding that, the biggest market opportunities exist in the following categories:

- Women's health- Hormone balance supplements, menopause supplements
- Lactation products
- Immunity- Tonics, capsules
- Nutrition bars and beverages
- Energy/ sports drinks
- Gut health- Prebiotic formulations
- Skin supplements, herbal cosmetics

There are a few challenges like lack of standardized extracts, limited clinical trials, adulteration and quality management, dosage standardization, and consumer awareness.

### **Regulatory Perspective:**

Dosage standardization is necessary for developing nutraceuticals and functional foods, especially in India, where Ayurvedic botanicals like Shatavari are governed by Ayush, Ayurveda Aahara Regulations, and FSSAI guidelines. The allowable dosage varies depending on factors such as extract standardization and intended use.

Usually, brands offer 250-500 mg per serving in capsules, 2-3 g in health drink powders, and 3-5 g in women's wellness mixes. These dosages ensure safety and efficacy. Further research and feedback may improve these standards while following traditional Ayurvedic practices.

**Conclusion:**

Shatavari shows a unique blend of traditional Ayurvedic knowledge and modern nutritional science. It is multi-functional, hence a valuable ingredient in the Nutraceutical and functional foods category. With growing consumer preferences, Shatavari holds a place for future product innovation. However, more studies and standardisation are required for using it to its full potential in the health industry.

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# REPORT OF THE WHITE PAPER LAUNCH TITLED "OPPORTUNITIES WITH WHOLE GRAINS TO SUPPORT METABOLIC HEALTH AMONG INDIANS: EVIDENCE MAPPING"



By  
Ms Anuja Padte,  
Food Scientist, PFNDIA

The Protein Foods and Nutrition Development Association of India (PFNDIA), in collaboration with ITC Limited and the Institute for Global Development (IGD), organized the launch of the white paper titled "Opportunities with Whole Grains to Support Metabolic Health among Indians: Evidence Mapping" on 30th March 2026 at ITCFSAN, Andheri, Mumbai. The document, authored by eminent scientists including Dr. B. Sesikeran MBBS, MD, Former Director ICMR-NIN, Dr. Sridevi Singh Former Director, CSIR-CFTRI, and Dr. Jagmeet Madan President, National Nutrition Science, highlighted the critical role of whole grains in

addressing the growing burden of metabolic disorders and non-communicable diseases in India.

The program commenced with a solemn condolence tribute to Dr. Sudershan Rao, former Deputy Director, ICMR-NIN and active member of the PFNDIA Scientific Advisory Committee, acknowledging his immense contributions to the field of nutrition science and public health. Dr. B. Sesikeran and Dr. J. I. Lewis paid heartfelt



Dr Lewis & Dr Sesikeran paid tributes to Dr Rao

respects, remembering his dedication and lasting impact on the scientific community.

Ms. Simran Vichare, Nutritionist, PFNDIA introduced all the authors, speakers, and dignitaries for the day.



Authors of White Paper

The welcome address by Dr. Shashank Bhalkar, Executive Director,



Release of White Paper

PFNDAI set the context for the event by emphasizing PFNDAI's long-standing commitment to nutrition awareness and the need to reintroduce whole grains into the Indian diet. He highlighted that traditional diets rich in whole grains have gradually shifted towards refined grains due to urbanization and lifestyle changes, contributing significantly to the rise in non-communicable diseases.



Dr Bhalkar Welcoming

and capacity building, established with support from the Global Food Safety Partnership. She noted its significant impact in training over 78,000 individuals and its collaborations with international bodies such as CODEX and USFDA. She also briefly mentioned the centre's advanced laboratory facilities and its role in offering regulatory training programs that bridge the industry-academia gap, before concluding with a note of thanks and a call for continued collaboration.

Science from ITC elaborated on CSR initiatives focused on nutrition and sustainable food systems, while Ms. Afreen Sultana from IGD shared insights from community-based interventions conducted in Tamil Nadu.



Ms Afreen Sultana

Ms. Subhpradha Nishtala, Founder - Food Adroit opened the session with a warm welcome, expressing her honour to be part of the event. She highlighted the vision and work ITCFSAN as global centre of excellence food safety



Ms Subhprada Nishtala

The session further included presentations from ITC and IGD representatives. Ms. Sreyashi Moitra Assistant Manager-Nutrition



Ms Sreyashi Moitra

The findings revealed low awareness of whole grains among young populations, along with key barriers such as cost, taste preferences, and cooking difficulties, while also highlighting a strong demand for convenient, ready-to-cook millet-based products.



Audience with Authors

Report of the White Paper Launch titled "Opportunities with Whole Grains to Support Metabolic Health among Indians: Evidence Mapping"



Chief Guest Dr Deepak Sawant

The keynote address by Chief Guest **Dr. Deepak Sawant**, Head, Task Force to Eradicate Malnutrition in Maharashtra provided valuable insights into the intersection of nutrition, public health, and sustainability. He emphasized the alarming rise in non-communicable diseases such as diabetes, hypertension, and cardiovascular conditions, noting that current systems primarily address hunger rather than nutritional adequacy. He strongly advocated for the inclusion of millets in the Indian thali while maintaining regional taste preferences, stressing that millet-based foods

must replicate familiar textures and flavors such as chapati, puri, and naan to ensure acceptance. He also highlighted the importance of translating the white paper into regional languages, improving the quality of grains in the Public Distribution System, and supporting farmers through better agricultural practices. Importantly, he positioned millets as a key solution not only for improving nutrition and combating malnutrition but also for addressing climate change due to their

resilience and sustainability.

The release of the white paper was followed by an engaging panel discussion moderated by **Dr. Shashank Bhalkar**, featuring the authors. The discussion focused on the strong scientific evidence linking whole grain consumption with reduced risk of non-communicable diseases, as well as challenges related to shelf life, processing, and consumer acceptability. The panel emphasized the need for technological innovations, development of convenient whole grain products, and collaborative efforts between industry, policymakers, and researchers to enhance consumption. The session was highly interactive and stimulated meaningful dialogue among participants.



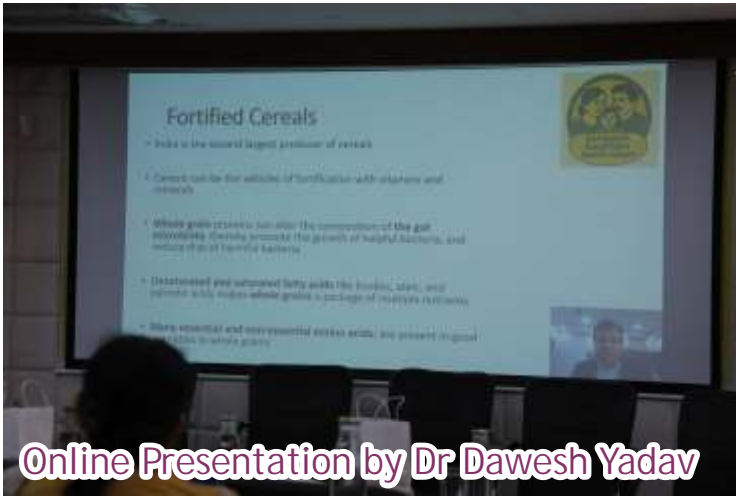
Panel Moderator Dr Bhalkar talking to panellists



Dr Sawant and Ms Simran



Dr Sesikeran



Online Presentation by Dr Dawesh Yadav



Dr Jagmeet Madan

A recorded presentation by **Dr. Dawesh Yadav**, Head, Department of Gastroenterology, Institute of Medical Sciences, Banaras Hindu University, Varanasi outlined the way forward, highlighting the role of whole grains in improving gut health and metabolic outcomes. He recommended that at least half of daily grain intake should come from whole grains and emphasized the inclusion of millets, brown rice, oats, and whole wheat in regular diets. He also suggested strengthening awareness programs, introducing whole grains in public nutrition schemes, standardizing labelling, and promoting

region-specific product development to improve acceptance.

After all the session's **Dr. Malathy Venkateshan**, Project Coordinator, PFNDAI, in her closing remarks



Summation by Dr Malathy

highlighted that the event successfully underscored the importance of transitioning from refined grains to whole grains as a key strategy for improving public health in India. She emphasized the dual benefits of millets in addressing both nutritional challenges and climate

resilience, while stressing the need for consumer-centric approaches that focus on taste, convenience, and affordability. The program concluded on a positive note, marking a significant step toward promoting whole grains as an integral component of India's dietary and public health framework.

At the close of the event, Ms. Simran Vichare delivered a vote of thanks, expressing sincere gratitude to the sponsors, speakers, authors, delegates, and PFNDAI team members for their invaluable contributions in making the event a resounding success.



Ms Naaznin Husein asking question



Dr Sridevi Singh

# REGULATORY ROUND UP



**AUTHOR**  
**Dr Shashank Bhalkar,**  
 Executive Director, PFNDAI  
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Dear Readers,

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

[System improvement in Payment workflow for visual inspection and laboratory testing charges in FICS/SWIFT to enhance ease of doing business](#) :

Presently, as per the Food Import Clearance system, consignments referred by ICEGATE to FSSAI undergo document scrutiny, visual inspection, and laboratory analysis sequentially. After

the scrutiny of the documents, the payment link is generated, and subsequent steps

occur only after the payment. As per this order, the importers are required to make payment after visual inspection but before the Provisional No Objection Certificate (P-NOC), No Objection Certificate (NOC), or Non-Conformance Certificate (NCC) is generated.

This flexibility will help to reduce the time by simultaneously carrying out processing activities.

[Advisory regarding non-use of Ashwagandha \(Withania Somnifera\) leaves in crude or extract or any other form](#)

[in food products](#) :

Schedule IV of Nutra Regulations 2016 allows only roots and its extract of Ashwagandha (*Withania somnifera*) in the formulations. FSSAI has noticed that some manufacturers are using leaves and their extracts of in their products. This advisory clarifies that such use is not permitted.

[Validity Order of FSSAI notified Food Testing laboratories as on 16th April 2026](#) :

This order provides the latest list of FSSAI-approved laboratories with validity of their accreditation as on 16.04.2026.

[Direction under Section 16\(5\) of Food Safety and Standards Act, 2006 regarding enforcement of the new standards for Meat Sausages notified under Food Safety and Standards \(Food Products Standards and Food Additives\) First Amendment Regulations, 2025](#) :

The implementation of new standards of meat sausages has been deferred to 01 November 2026 on the request by the industry representations.

[Draft Food Safety and Standards \(Packaging\) Amendment Regulations, 2026, regarding the inclusion of the list of packaging materials for pan masala](#) : Draft regulation proposes amendments in

FSS(Packaging) Regulations 2018. In Schedule IV, packing materials for Pan Masala has been suggested. Only paper, tin, and glass are allowed for packing or storing Gutakha, Tobacco, and Pan Masala. Objections or suggestions must be submitted within 30 days of 28.04.2026, in the given format, to the Food Authority.

[Monitoring the Sale of Fresh Fruits for the Use of Unauthorized or Prohibited Artificial Ripening Agents](#) : This is a reiteration of the earlier order dated 16.05.25, prohibiting the use of Calcium Carbide (locally known as masala)



for artificial ripening of seasonal fruits. Further, the order also prohibits the direct contact of fruits with ethephon and ethylene in liquid and powder form for ripening.

Local food authorities are advised to intensify inspections and strict vigilance in fruit markets and mandis. Enforcement officials may use strip paper tests to detect the presence of acetylene in godowns and ripening chambers.



# RESEARCH IN HEALTH & NUTRITION

## What Happens After Ozempic Shocked Researchers

A large real-world study from Cleveland Clinic has challenged the assumption that stopping GLP-1 drugs like semaglutide (Ozempic/Wegovy) and tirzepatide (Mounjaro/Zepbound) inevitably leads to rapid weight regain.

Examining nearly 8,000 patients in Ohio and Florida, researchers found that most individuals who discontinued these medications managed to maintain their weight or even continue losing. This was often achieved by restarting treatment, switching to other medications, or adopting structured lifestyle

changes with professional support.

The study revealed that patients treated for obesity lost an average of 8.4% of their body weight before stopping and regained only 0.5% after one year. Those treated for type 2 diabetes lost 4.4% before discontinuation and went on to lose an additional 1.3% over the following year. While some patients did regain weight—55% in the obesity group and 44% in the diabetes group—nearly half either maintained or continued losing weight. These outcomes contrast with earlier clinical trials, which showed patients regaining more than half of their lost weight within a year after stopping treatment. The reasons for discontinuation were primarily financial

barriers and side effects, with cost being the most common factor. Patients with diabetes were more likely to restart therapy, likely due to more consistent insurance coverage. Within a year of stopping, 27% of patients switched to another medication, 20% restarted their original drug, 14% pursued lifestyle-focused care, and less than 1% underwent bariatric surgery.

The findings underscore the importance of ongoing, individualized support in obesity management. Rather than viewing discontinuation as the end of treatment, many patients continue their weight management journey through alternative strategies. Researchers emphasize that this adaptability in real-world practice helps explain why weight regain is less pronounced compared to controlled trial settings, offering a more hopeful outlook for long-term outcomes after stopping GLP-1 therapies.

<https://www.sciencedaily.com/releases/2026/03/260319044648.htm>

## Clinical Trial Reveals Ashwagandha Nutraceutical Improves Stress Relief and Sleep

A recent clinical trial has provided new evidence supporting the stress relief and sleep enhancing benefits of Prolanza, a sustained release ashwagandha nutraceutical. The study, published in *Medicine*, involved 135 healthy adults aged 20 to 55 who were experiencing moderate stress.

Participants were randomized to receive either 150 mg, 300 mg of Prolanza, or a placebo daily for 60 days. Both doses significantly reduced perceived stress — by 38.6% with 150 mg and 41.6% with 300 mg compared to placebo — while also improving sleep quality, happiness, and eating behaviours. Importantly, the higher 300 mg dose lowered serum cortisol levels by 19.15%, indicating a measurable biological effect on stress regulation.

The sustained release

formulation was designed for once daily use, supporting compliance without sacrificing efficacy. Improvements were observed across psychological well being, sleep, and eating behaviour, with the higher dose additionally reducing stress related eating.

No safety concerns were reported during the trial. These findings strengthen the evidence base for Prolanza's effectiveness at both low and higher doses, making it a consumer friendly option for stress and sleep support.

Ashwagandha, long used in traditional remedies, has been under scrutiny by regulators in Europe due to concerns about potential risks such as effects on thyroid function, immune modulation, and hepatotoxicity. Denmark has banned it in supplements, while Dutch and French authorities advise caution for certain groups.

However, experts note that substantial data exists to address many of these concerns.

Previous studies have also shown ashwagandha extracts to improve sleep quality, reduce anxiety, and alleviate chronic stress symptoms. This new trial adds to the growing body of

evidence that carefully formulated ashwagandha nutraceuticals can deliver meaningful health benefits in modern contexts.

<https://www.nutritioninsight.com/news/nutriventia-ashwagandha-stress-sleep-supplements.html>

## High Meat Consumption Linked to Decreased Dementia Risk

A long term study from Karolinska Institutet has found that higher consumption of unprocessed meat may be linked to a reduced risk of dementia and slower cognitive decline among people carrying the APOE 3/4 and 4/4 genotypes, which are associated with a higher risk of Alzheimer's disease..

The research followed 2,157 participants aged 60 and above for up to 15 years, none of whom had dementia at the start. Results showed that those with these genotypes who ate more meat had significantly slower cognitive decline and lower dementia risk, while those with low meat intake had more than double the risk of developing dementia.

The study, published in JAMA Network Open, suggests that APOE4 – the evolutionarily oldest variant of the gene – may have developed during a period when human diets were more animal based, potentially explaining the observed protective effect. Interestingly, lower consumption of processed meats was associated with reduced dementia risk regardless of genotype, highlighting the importance of distinguishing between processed and unprocessed meat.

Experts caution that the findings are observational and based on self reported dietary data, which can be unreliable, especially in individuals with early cognitive decline. They stress that causality cannot be established and that socioeconomic and lifestyle factors may also play a role. Independent commentators note that while the study was

well conducted, the associations were only marginally significant and limited to specific genetic subgroups. Clinical trials are needed to confirm whether tailored dietary recommendations based on APOE genotype could help reduce dementia risk.

Beyond dementia, the study also found lower all cause mortality among APOE carriers with higher unprocessed meat intake. The authors emphasize that this is still a relatively new area of research and should be interpreted cautiously. Other recent studies have pointed to different dietary factors in brain health, such as moderate coffee intake and higher omega 3 fatty acid levels, both of which have been linked to reduced dementia risk and slower cognitive decline.

<https://www.nutritioninsight.com/news/meat-intake-lowers-dementia-risk-apoe.html>

## ARA and DHA Balance in Infant Formula

The balance of arachidonic acid (ARA) and docosahexaenoic acid (DHA) in infant formula is critical, and these fatty acids must be considered together rather than independently.

Human milk naturally contains both, with ARA levels typically exceeding DHA, and infants cannot synthesize enough of either to meet developmental needs. Clinical evidence shows that formulas lacking pre formed ARA and DHA result in lower tissue levels compared to breastfed infants, underscoring the importance of dietary provision.

DHA plays a central role in brain and visual development, accumulating rapidly in the prefrontal cortex and retina during late gestation and early life. ARA, meanwhile, is a major structural component across multiple tissues and serves as a precursor to eicosanoids that regulate immunity, inflammation, vascular development, blood clotting, and growth.

Research indicates that optimal formula design requires ARA levels at least equal to DHA, ideally at a ratio of 1:1 to 2:1, reflecting human milk composition. Benefits of this balance have been observed in neurodevelopmental outcomes

lasting into childhood, while excessive DHA relative to ARA may diminish these advantages.

Global authorities, including the European Food Safety Authority, have set adequate intake levels that prioritize ARA

above DHA, reinforcing the need for balanced inclusion in formulas.

<https://www.nutritioninsight.com/news/dsm-firmenich-ara-dha-infant-formula.html>

## Coffee and tea may boost cognitive health and reduce the risk of dementia, study finds

The study reports that moderate coffee and tea consumption may help protect cognitive health and reduce dementia risk. Researchers followed more than 131,000 participants over a period of up to 43 years, during which 11,033 developed dementia.

Those who drank two to three

cups of coffee daily had an 18% lower risk of dementia compared to non drinkers, showed slower cognitive decline, and performed better on cognitive tests. Tea drinkers showed similar benefits, while decaf coffee did not, pointing to caffeine as the likely driver of these effects.

The protective association was consistent across people with both high and low genetic risk for dementia, suggesting caffeine's benefits are broadly applicable. The researchers emphasize that while the effect

size is modest, caffeinated coffee or tea can be one piece of a larger strategy to preserve brain health. Other studies have linked coffee to slower biological aging, improved neuroplasticity, reduced cardiovascular risk, and positive effects on gut microbiota. Together, these findings highlight coffee and tea as potentially valuable dietary interventions for long term cognitive resilience.

<https://www.nutritioninsight.com/news/coffee-cognitive-health-dementia-risk.html>

## Harnessing Postbiotics: Nutraceutical Innovations for the Gut Microbiome

Postbiotics are emerging as a powerful new frontier in gut health, offering advantages over traditional probiotics because they remain effective without requiring live bacteria.

Postbiotics are defined as inactivated microbial cells or their components, a concept formally recognized in 2021. Unlike probiotics, which must survive and colonize the gut, postbiotics can deliver benefits simply by interacting with the gut lining, making them safer, more stable, and easier to incorporate into a wide range of food and beverage

applications.

Cargill's EpiCor postbiotic was showcased for immune health, while Kerry presented Plenibiotic for digestion and skin support. Kerry also emphasized its BC30 probiotic, a highly stable strain that can withstand challenging food environments, underscoring how both probiotics and postbiotics are evolving to meet consumer needs. Morinaga highlighted its LAC Living+ postbiotic, shown in clinical studies to support mood, quality of life, and reduced fatigue, alongside a probiotic strain for cognitive support. ADM added to the conversation with postbiotics like *Lactobacillus gasseri* CP2305, linked to stress

reduction, mood enhancement, and better sleep via the gut brain axis.

Consumer awareness is growing rapidly, with people increasingly seeking clinically validated, mechanistically driven products that go beyond general wellness claims. Surveys suggest strong interest in postbiotics, even among those unfamiliar with the term, largely because they build on the popularity of probiotics. Experts note that the gut's central role in immunity and overall health makes postbiotics particularly compelling, as they can be formulated into shelf stable products without losing efficacy.

<https://www.nutritioninsight.com>

This positions them as versatile tools for supporting digestion, immunity, mood, skin health, and even cognitive function,

while aligning with consumer demand for convenience and transparency.

<https://www.nutritioninsight.com/news/postbiotics-gut-health-probiotics.html>

## Higher Linoleic Omega-6 Fatty Acid Intake Linked to Lower Dementia Risk

A large UK Biobank study involving 273,795 participants has found that higher levels of linoleic acid, the most common omega-6 fatty acid derived mainly from plants, are linked to an 18% lower risk of dementia.

In contrast, higher levels of other omega-6 fatty acids, particularly those concentrated in animal products such as red meat, organ meats, eggs, and poultry, were associated with a 21% higher risk. The research highlights that not all omega-6 fatty acids affect brain health in the same way, with linoleic acid appearing protective while non-linoleic types may increase risk.

Over a median follow-up of 15 years, 5,799 dementia cases were identified. Linoleic acid accounted for about 75% of total omega-6 fatty acids in the blood, while six other types made up the remaining 25%. Among these, arachidonic acid was the most abundant, though the study notes that current testing methods cannot precisely measure its levels. This distinction between plant-based and animal-based omega-6 sources adds nuance to the ongoing debate about dietary fats and cognitive health.

The authors emphasize that omega-6 fatty acids should not be treated as a single, interchangeable group. Their findings suggest that dietary patterns that raise plasma linoleic acid—such as consuming nuts, seeds, and plant oils—may help reduce dementia risk, while diets high

in animal-derived omega-6s could have the opposite effect. Although the study is observational and cannot prove causation, it provides strong evidence that different omega-6 fatty acids have distinct associations with long-term brain outcomes.

The research was conducted in collaboration with OmegaQuant, which previously reported that higher omega-3 levels in the blood were linked to a 35–40% lower risk of early-onset dementia. Together, these findings underscore the importance of distinguishing between specific fatty acids rather than grouping them broadly, and they point toward future studies that could refine dietary recommendations for brain health.

<https://www.nutritioninsight.com/news/linoleic-omega-6-fatty-acid-dementia-brain-diet.html>

## Peanuts Offer a Rich Protein Source for Building Muscle Among Seniors

A six month study conducted at Deakin University's Institute for Physical Activity and Nutrition in Melbourne has shown that daily peanut butter consumption can significantly improve muscle power in older adults.

The trial involved 120 participants aged 66 to 89 who were at risk of falls. Those

assigned to consume 43 grams of natural peanut butter each day — providing about 10 grams of protein — demonstrated faster performance in the five times sit to stand test compared with controls, indicating stronger lower body muscle power. Importantly, the intervention group increased their intake of protein and unsaturated fat without experiencing weight gain.

Researchers highlight that peanuts contain more protein than any other nut, making peanut butter a practical way to boost daily protein intake, especially for seniors who may struggle to chew whole nuts.

Beyond protein, peanuts provide unsaturated fats, micronutrients, and phytochemicals that together form a beneficial food matrix. This combination may reduce oxidative stress and preserve muscle quality, contributing to improved muscle power, which is critical for everyday tasks such as climbing stairs or rising from a chair and for reducing fall risk.

The study suggests peanut butter could serve as an affordable, familiar alternative to costly oral nutrition supplements often used in clinical settings.

While not a complete replacement for specialized products, its palatability and accessibility may encourage better adherence among

generally healthy older adults. The findings, published in the Journal of Cachexia, Sarcopenia and Muscle, underscore the role of simple dietary strategies in

promoting healthy aging.

<https://www.nutritioninsight.com/news/peanuts-protein-healthy-aging-muscles-seniors.html>

## Supplements Spotlight Psychobiotics and Calm Clarity

The mental wellness supplements market is undergoing a notable transformation, shifting away from traditional capsule formats toward lifestyle-oriented products such as stick packs and powdered drink mixes that integrate seamlessly into daily routines.

This evolution reflects a broader consumer preference for self-care rituals rather than medicine-like approaches. Psychobiotics — probiotics and postbiotics that act on the gut-brain axis — are gaining traction as tools to manage stress, mood, and sleep without the overstimulation associated with caffeine.

Botanical innovations are also shaping the category. Black cardamom extracts are being developed to deliver clean mental energy and improved

reaction times without jitters or crashes. Another ingredient derived from black cumin seed, has demonstrated benefits for sleep quality and stress resilience in multiple human studies. Meanwhile, fermentation-derived salidroside offers a sustainable alternative to rhodiola, supporting mental resilience and reducing fatigue during stress while avoiding the harvesting of endangered plants.

Probiotic and postbiotic strains are central to this new era of mood support. Probiotics highlights Lactobacillus plantarum DR7 and KABP-051 for their role in modulating serotonin and dopamine production, while Lactobacillus gasseri CP2305 postbiotic, which has shown benefits across mood, stress, and sleep in several clinical trials. These biotic solutions are increasingly positioned as science-backed, holistic approaches to emotional well-being.

At the same time, consumer awareness of conventional nutrients remains uneven. While iron, B-vitamins, and omega-3s are widely recognized, knowledge of specific long-chain omega-3s like DHA and EPA is much lower, despite their strong links to brain health. Botanicals such as ashwagandha, ginseng, and chamomile are also gaining attention, supported by growing evidence of their roles in stress resilience and mood balance.

Overall, the market is moving toward multi-benefit products that combine biotics, botanicals, and essential nutrients, designed to support steady performance, emotional balance, and restorative sleep. This reflects a broader cultural shift in which mood supplements are no longer viewed as clinical interventions but as accessible, everyday tools for holistic self-care.

<https://www.nutritioninsight.com/news/mood-supplements-probiotics-brain-health-wellness.html>

## WHO partners with Novo Nordisk to tackle rising child obesity in India

The WHO Foundation and Novo Nordisk have announced a partnership to address the growing challenge of childhood obesity in India, focusing on prevention through school-

based health programs.

The initiative emphasizes integrating health screening, nutrition education, and physical activity directly into the school day, positioning schools as central environments for fostering healthy habits early in life.

India has seen a sharp rise in childhood and adolescent obesity, making it a priority country for this collaboration.

The program aims to strengthen primary healthcare systems, promote balanced nutrition, and encourage active lifestyles to reduce long-term risks associated with obesity. According to WHO, childhood overweight and obesity already cause more deaths globally than undernutrition, and early prevention is critical since children who are obese are more likely to remain obese into adulthood.

Anil Soni, CEO of the WHO Foundation, highlighted the importance of prevention-first approaches that build resilience in health systems and communities. Vikrant Shrotriya, managing director of Novo Nordisk India, stressed that empowering youth with knowledge and lifelong healthy habits is essential to safeguarding the nation's future health.

The partnership comes at a time when nutrition-related challenges in India are compounded by issues such as inconsistent food labelling and the prevalence of ultra-processed foods in children's diets. Recent studies have shown that infant and early-life nutrition strongly influences obesity risk later in childhood, underscoring the need for clear national guidelines and effective interventions.

By combining global expertise with local implementation, the WHO-Novo Nordisk collaboration seeks to create sustainable, scalable solutions to curb childhood obesity, ensuring healthier communities and stronger foundations for long-term public health.

<https://www.nutritioninsight.com/news/who-novo-nordisk-child-obesity-india.html>

## Functional Dairy's Next Phase: From Gut Health to Stress Relief

The functional dairy market is entering a new phase, projected to grow from \$51 billion to \$79 billion over the next decade, driven by rising health awareness and consumer demand for wellness-oriented products.

Traditionally associated with digestive health, dairy is now evolving beyond gut-focused offerings as competition intensifies. Launching probiotic yogurts alone is no longer sufficient, with new entrants needing scientific credibility and distinct propositions to stand out against established industry leaders.

US brand Sourmilk exemplifies this shift by positioning its yogurt as a probiotic supplement, using proprietary strains that support oxytocin signalling in the gut and immune function. Its approach underscores that not all yogurt cultures deliver health benefits, and sourcing nutrient-dense milk, such as organic grass-fed, further enhances product value. In the UK, Tom Parker Creamery has introduced Bedtime Milk, a category-first product designed to aid sleep, combining milk with botanicals that reduce stress. This innovation reflects a broader move toward dairy products that address lifestyle concerns such as relaxation and sleep quality.

Both companies highlight the potential of familiar formats like yogurt and milk to deliver targeted, purpose-led functionality that feels natural and easy to integrate into daily routines. With yogurt already reaching 92% of US households, functional innovation in widely consumed products offers significant opportunity. The future of functional dairy is expected to expand into areas such as stress relief, sleep support, and bioactive proteins, signalling a shift from traditional digestive health toward a more holistic role in consumer wellness.

<https://www.foodnavigator-usa.com/Article/2026/03/02/functional-dairys-future-gut-health-sleep-support-new-science/>

## Aging Microbiome & Its Connection to Muscle Loss

Aging is increasingly linked to changes in the gut microbiome, with research suggesting that reduced microbial diversity and weakened intestinal barrier function may contribute to muscle decline in older adults.

A recent review highlights how shifts in microbial composition and gut integrity could play a role in sarcopenia, the age-

related loss of muscle mass and strength.

Scientists are exploring how the microbiome influences muscle health through mechanisms such as nutrient absorption, inflammation regulation, and metabolic signalling. The decline in beneficial bacteria and the rise of harmful microbes with age may impair these processes, potentially accelerating muscle deterioration.

muscle axis reflects a broader effort to understand how microbiome modulation—through diet, probiotics, prebiotics, or other interventions—could support healthy aging. As the global burden of sarcopenia grows, the microbiome is being recognized as a promising target for strategies aimed at preserving muscle function and quality of life in later years.

<https://www.nutraingredients.com/Article/2026/03/17/the-aging-microbiome-and-its-connection-to-muscle-decline/>

This emerging focus on the gut-

# & FOOD SCIENCE INDUSTRY NEWS

## New Microwave Frying Technique Could Make French Fries Much Healthier

Researchers at the University of Illinois Urbana-Champaign have developed a novel frying method that combines conventional frying with microwave heating to produce French fries that are less greasy but still crispy and flavourful.

The innovation lies in how microwaves alter the pressure dynamics inside the potato during cooking. Normally, as water evaporates from the

potato, empty pores form and negative pressure draws oil inward. Microwaves, however, heat from the inside out, causing water molecules to oscillate and generate vapor that shifts the pressure toward the positive side. This internal pressure helps push oil out rather than allowing it to seep in, reducing overall fat absorption.

The team tested the process using a specially designed microwave fryer operating at two frequencies, 2.45 GHz and 5.8 GHz, while frying potato strips in soybean oil at 180°C. Measurements of temperature, pressure, moisture, texture,

and oil content showed that microwave-assisted frying accelerated moisture loss, shortened cooking times, and lowered oil uptake. However, microwave frying alone produced soggy fries, so the researchers recommend combining it with conventional frying to achieve both crispiness and reduced fat.

Mathematical models were also developed to simulate how temperature, pressure, and moisture interact under different frying conditions, providing deeper insight into the process. The practical implication is that industrial fryers could be upgraded with microwave generators, which are relatively inexpensive and widely available, making this technique feasible for large-scale food production.

<https://www.sciencedaily.com/releases/2026/04/260402042803.htm>

## Clinically Validated AI Platform for Plant Bioactives Discovery

World's first clinically validated AI innovation platform is introduced for plant bioactives, aiming to transform how health science companies discover and commercialize natural compounds.

At the heart of this system is Forager, a proprietary AI engine that maps more than 11 million natural compounds across 23 health territories, positioning itself as the largest proprietary bioactive data bank. Unlike general AI models trained on public datasets, Brightseed emphasizes that its platform is built on proprietary biological

intelligence, multi omics data, and machine learning designed for scientific rigor and traceability.

The company argues that traditional health innovation has been hampered by fragmented workflows and late stage risk discovery, with over 75% of early product ideas failing to reach market. Its Innovation Platform is designed to unify discovery, development, and commercialization, preserving scientific insight and evidence throughout the process. Recent successes include BioMetaControl, a bioactive blend shown to help stabilize glucose levels in adults transitioning off GLP 1 medications and improve glycemic markers in

prediabetic adults, and Bio Gut Core, which supports gut barrier function and alleviates bloating and discomfort.

Rapid Profiling capability allows it to deliver actionable insights on phytochemical and bioactive composition within six to eight weeks, accelerating clinical validation and commercialization. The company already has more than 40 partnerships across consumer health, nutrition, personal care, pharmaceuticals, and animal health, and is moving toward a subscription model for its platform.

<https://www.nutritioninsight.com/news/brightseed-ai-forager-bioactives-botanical-supplements.html>



## Kimchi Bacteria Flush Nanoplastics from Gut with Added Heart Health Benefits

The findings from the World Institute of Kimchi highlight a fascinating dual benefit of traditional fermented foods.

Researchers identified a strain of lactic acid bacterium, *Leuconostoc mesenteroides* CBA3656, that binds to polystyrene nanoplastics in the gut. In simulated human intestinal conditions, this strain maintained a 57% adsorption rate, far outperforming a reference strain that dropped to just 3%. In germ-free mice, supplementation with CBA3656 doubled the amount of nanoplastics excreted in feces compared to controls,

suggesting a biological pathway for mitigating plastic pollution inside the body.

This discovery is significant because nanoplastics, which are less than one micron in size, can cross into organs such as the kidney and brain, raising concerns about long-term health effects. The study suggests that microbes from fermented foods could serve as biological tools to reduce this burden, offering a novel public health strategy against environmental contaminants.

Complementing this, a separate analysis of South Korean national health data linked higher consumption of kimchi and other fermented foods to lower systemic inflammation, measured by reduced C-reactive protein levels. While the study did note a slight increase in total cholesterol, it

was too small to be clinically meaningful. The results point to potential cardiometabolic benefits of fermented food intake, though the cross-sectional design means causality cannot be firmly established. Researchers emphasize that future work should explore whether the observed benefits stem directly from live microbes or from broader dietary patterns associated with fermented food consumption.

Together, these studies position kimchi not only as a cultural staple but also as a promising contributor to both environmental health through nanoplastics removal and human health through inflammation reduction.

<https://www.nutritioninsight.com/news/kimchi-nanoplastics-heart-health.html>



## Researchers Find Upcycled Wheat Bran Gel Can Improve Plant-Based Food Texture

Researchers at Sweden's KTH Royal Institute of Technology have developed a wheat bran based gel designed to improve the texture and stability of plant based foods.

The innovation combines wheat bran fibre and gluten protein through an enzymatic process using laccase, creating a stable hydrogel that can thicken, stabilize, or add texture to meat and dairy substitutes.

This marks the first successful incorporation of wheat gluten protein into hydrogels based on wheat bran arabinoxylan.

The study demonstrates how upcycling wheat milling by products—typically used as livestock feed—can transform low value bran into functional food ingredients. Wheat milling produces about 23-27 percent by products globally, exceeding 150 million metric tons annually, most of which are not used for human consumption. The new gel offers a way to valorise these side streams, turning them into soft, jelly like materials suitable for plant based foods, snacks, sauces, and nutrition products.

Lead researcher Francisco Vilaplana explains that combining protein and fibre yields functional hydrocolloids with improved nutritional properties and better texture than traditional plant proteins, which often form brittle or uneven gels. The Plenty research centre at KTH is now expanding this biotechnological approach to other plant proteins such as pea and soy, aiming to reduce food waste and create circular supply chains by adding new value to agricultural side streams.

<https://www.foodingredientsfirst.com/news/wheat-bran-hydrocolloid-plant-based-texture.html>



## Protein Pasta Goes Mainstream as Heritage Brands Embrace Functional Reformulation

PFNDAI May 2026

Protein pasta has entered the mainstream as traditional and major brands reformulate to meet growing demand for

functional, nutrient-rich staples.

Italian pasta maker Rummo exemplifies this shift with its new Maxima range, a

“protein-forward” line made from durum wheat semolina and yellow peas, offering 21 grams of protein per serving. The company maintains its patented Lenta Lavorazione slow-processing method to preserve the classic texture and flavour while enhancing nutritional value.

This movement reflects broader consumer trends toward high-protein, high-fibre foods that provide satiety and align with

modern dietary habits, including those influenced by GLP 1 medication use. Rummo’s success has led to expanded distribution across major retailers such as Whole Foods and Sprouts.

Globally, brands are following suit: Byodo Naturkost launched Protein Plus Pasta in Germany, Pasta Garofalo introduced a high-protein line in the US, Kraft debuted PowerMac, and Grupo Gallo released Gallo

+Proteína in Spain. Cizzle Brands also entered the market with HappiEats Sport Pasta for athletes. These innovations highlight how heritage and contemporary producers alike are modernizing pasta to deliver enhanced nutrition without compromising taste or tradition.

<https://www.foodingredientsfirst.com/news/protein-pasta-rummo-functional-foods-trend.html>

## Navigating Consumer Demand for Health-Driven Formulas

The latest insights from Innova Market Insights show how consumer preferences are reshaping ingredient strategies across the food and beverage industry.

Globally, most people now treat ingredients as tools for managing health, with protein, vitamins, and fibre topping the list of sought after nutrients. Protein has moved beyond its traditional association with sports and muscle building to become linked with energy, mental clarity, and healthy aging, driving a surge in product launches that combine protein with functional health

claims.

Gut health is another major driver, with fibres such as oat fibre, inulin, and soluble corn fibre gaining traction in new launches. At the same time, naturalness has shifted from a premium differentiator to a baseline expectation, with nearly seven in ten consumers associating natural products with long term health. Botanical ingredients, including adaptogens, chamomile, fungi, and algae, are expanding into functional categories, particularly around mental well being.

On the reduction side, sugar remains the primary target, though consumers are unwilling to sacrifice taste or accept artificial alternatives. This creates pressure for ingredient suppliers to develop smarter

reduction systems that maintain indulgence. Artificial sweeteners are increasingly avoided, while fibre and whole ingredients are being used to support low glycemic index claims.

Overall, the trends point to three converging strategies: adding functional nutrients, demanding naturalness, and cutting perceived risk ingredients. Consumers are effectively acting as their own nutritionists, carefully reading labels, stacking benefits, and making deliberate trade offs. Brands that respond with clear communication and thoughtful formulation are best positioned to build lasting trust.

<https://www.foodingredientsfirst.com/news/ingredients-health-tools-innova-trends.html>

## Chocolate Alternative Innovation Accelerates as Food Innovators Tackle Cocoa Disruption

Chocolate makers are increasingly turning to cocoa free alternatives as a way to manage volatility in cocoa prices, supply disruptions, and

regulatory pressures.

Italian foodtech company Foreverland has raised €6 million to expand its Choruba line, becoming the first industrial scale producer of organic cocoa free chocolate. Its facility in Italy uses locally sourced Mediterranean ingredients such as carob to create alternatives tailored for

industrial confectionery applications, supported by IFS certification for quality and safety.

This development reflects a broader structural shift in the chocolate industry. While conventional chocolate remains dominant, major players like Barry Callebaut, Cargill, and Fuji Oil are investing in cocoa

alternatives alongside traditional portfolios. Barry Callebaut, for example, is scaling up ChoViva, a sunflower based chocolate, while also committing € 250 million to upgrade its Wieze factory in Belgium and opening a global innovation centre in Singapore. Cargill and Fuji Oil are expanding their portfolios with cocoa butter equivalents and compound coatings that reduce

cocoa content without compromising performance.

The push toward cocoa free innovation is driven by climate challenges, disease risks in West Africa, and new regulations such as the EU Deforestation Regulation, which requires traceable, deforestation free cocoa. At the same time, consumer demand for healthier, clean label, and plant based snacks is

reinforcing reformulation. Cocoa free chocolate is carving out a permanent role in the industry, not as a replacement but as a stabilizing ingredient strategy that helps manufacturers manage costs, ensure supply, and meet evolving health and sustainability expectations.

<https://www.foodingredientsfirst.com/news/cocoa-free-chocolate-innovation-foreverland-europe.html>

## Fiber Tech for High-Protein, Plant-Based Chicken Fillet

Schouten Europe has introduced a plant based chicken fillet that uses fibre technology to replicate the texture and bite of real meat while delivering high nutritional value.

The product achieves a Nutri Score A rating, offering both high protein and fibre content, and can be fortified with iron and vitamin B12. Its design allows for recognizable meat like shapes through 3D shaping,

enhancing consumer appeal and versatility in hot or chilled applications.

Unlike conventional methods such as high moisture extrusion, which are energy intensive, Schouten's fibre technology requires fewer processing steps and streamlines raw material use, reducing transport movements and lowering environmental impact. Internal analysis suggests this approach can cut the environmental footprint of meat substitutes by 10-30%, depending on formulation and supply chain.

The innovation responds to rising demand for sustainable, nutrient rich meat alternatives in Europe, where sales of substitutes are projected to grow at a 6% CAGR through 2027. Schouten, established in 1990 and known as the first Dutch company to develop plant based proteins, sees strong potential to scale this fibre technology across a wider range of applications, positioning it as a key driver in the continued growth and diversification of plant based foods.

<https://www.foodingredientsfirst.com/news/fiber-technology-plant-based-fillet-schouten.html>

## Encapsulation Boosts Flavour Control in Bakery, Snacks & Meat

Microencapsulation technology traps sensitive aromatic compounds in coatings such as maltodextrin or starch, shielding them from heat, oxygen, and moisture while allowing controlled or delayed release.

This enables flavours, acids, and extracts to remain stable during demanding processes like baking, frying, or extrusion, and then deliver

their impact exactly when needed.

The technology supports reformulation goals by improving taste efficiency, which helps reduce reliance on sugar, salt, and synthetic additives. By tailoring coatings—fat based, waxes, or carbohydrate systems—manufacturers can design multi stage release profiles, creating layered taste experiences such as sour bursts or delayed acidity. This approach not only enhances flavour but also supports clean label strategies by minimizing stabilizers and corrective

additives.

Applications across bakery doughs, meat and sausage products, dairy, snacks, and convenience foods, where encapsulation ensures consistent taste profiles and process stability. Challenges in scaling encapsulated systems, such as maintaining particle uniformity and release behaviour under industrial conditions, but leverages expertise in fluid bed coating and process control to overcome them.

Encapsulation to drive innovation in targeted

sensory effects, sugar and salt reduction, and personalized nutrition. Controlled release will allow manufacturers to design dynamic taste

experiences while integrating functional ingredients more effectively, positioning encapsulation as a key enabler of differentiated, reliable food

solutions.

<https://www.foodingredientsfirst.com/news/microencapsulation-food-flavor-control-raps.html>

## Science Meets Confectionery: Chocolate Flavour Innovation

Mondel z International has partnered with Aston University in the UK to explore how advanced membrane based filtration technologies can transform chocolate flavour development.

The collaboration applies biological membrane proteins, traditionally used in water processing, to food ingredients, with the goal of filtering or modifying compounds that influence taste and aroma. This could allow high cocoa chocolate to be produced without added sugar by

removing bitterness while enhancing desirable flavour notes.

The project brings together Aston's Institute for Membrane Excellence with Mondel z's Bournville R&D team, leveraging the region's chocolate making heritage. Researchers are focusing on taste receptor proteins to capture specific compounds, potentially creating chocolates with distinctive profiles and improved sensory appeal.

The initiative comes at a time when Mondel z faces challenges from record cocoa costs, which have driven up production expenses and pressured profitability. By investing in scientific

innovation, the company aims to meet consumer demand for indulgent yet healthier snacks while addressing industry wide volatility in cocoa supply.

This partnership reflects a broader trend in confectionery, where companies are experimenting with cocoa free alternatives, cultivated cocoa, and AI driven innovation centres. Despite declining chocolate volumes, younger consumers remain engaged, and novel experiences like flavour enhanced high cocoa chocolate could help reinvigorate the category.

<https://www.foodingredientsfirst.com/news/mondelz-aston-university-chocolate-flavor-innovation.html>

## How Lactose-Free Milk Can Boost Dairy Consumption in Coffee Shops

A recent study highlights how lactose free milk could significantly boost dairy consumption in coffee shops by appealing to both lactose intolerant consumers and those who currently choose plant based alternatives.

Researchers at Chapman University found that many coffee drinkers would switch to lactose free milk if it were readily available and clearly labelled, provided it matched the taste and texture of regular milk.

The study revealed that more than one third of flexitarians and nearly one third of plant based milk drinkers would be more likely to visit coffee shops offering lactose free options.

While oat milk remains the most popular plant based choice for its creaminess, whole dairy milk continues to be valued for its richness and familiarity. Lactose free milk offers a digestible alternative with a similar nutritional profile, positioning it as a bridge between traditional dairy and plant based substitutes.

Global demand for lactose free products is rising, with the market projected to reach US\$28 billion by 2033. However,

growth is challenged by consumer scepticism about labelling accuracy, with over a third of consumers doubting "lactose free" claims. Tools like Kerry's LactoSens, which provides rapid on site verification, aim to address this trust gap.

The findings suggest that coffee shops could expand dairy consumption by offering lactose free milk as a mainstream option, meeting consumer expectations for taste, digestibility, and transparency while tapping into a growing segment of health conscious and flexible eaters.

<https://www.foodingredientsfirst.com/news/lactose-free-milk-growth-opportunity-coffee.html>

## Gen Z Redefines India's Dessert Culture with Demand for Novelty, Authenticity and Visual Appeal

Gen Z in India is redefining dessert culture through a blend of creativity, authenticity, and visual appeal.

Their high consumption frequency and social media influence make them the driving force behind packaged dessert growth. Ice cream and chocolate remain popular, but sweet bakery resonates more deeply, reflecting how this generation views desserts as

experiences rather than mere indulgences. Café culture and social discovery amplify this trend, with many Gen Z consumers willing to pay extra for caffeine-infused or focus boosting desserts.

Flavors such as matcha, kunafa, and Dubai chocolate are shaping a “green aesthetics” movement, with pistachio and matcha gaining visibility in packaged launches. Matcha, once niche, is now mainstream, often paired with chocolate or fruit to balance its bitterness. Despite this appetite for innovation, fewer than 1% of Indian dessert launches between 2022 and 2025 were limited editions or co branded, revealing a major opportunity for brands to connect with younger consumers through time bound drops and pop

culture collaborations.

India's dessert market reflects three consumer mindsets: Taste First Indulgers, Sweet Spot Balancers, and Health Prioritisers. Gen Z aligns most with indulgence, rewarding products that deliver authenticity and visual impact, while older generations lean toward moderation and health. The most immediate growth potential lies in limited edition collaborations and adapting global flavours into Indian friendly formats that feel aspirational yet approachable—desserts that delight both on social media and in everyday life.

<https://www.mintel.com/press-centre/gen-z-redefines-dessert-culture-in-india/>

## Evolution Of Heat Preferences: Leading Asia's Spicy Food Revolution

The appetite for spicier foods across Asia reflects a deeper cultural and culinary shift rather than a passing trend. Consumers are increasingly drawn to bold, authentic flavours, with 65% globally reporting they eat spicier foods than a year ago.

In Asia Pacific, this demand translates into rapid innovation cycles and heightened expectations for layered taste experiences. People are no longer chasing pure heat but are seeking the nuanced flavour profiles of different chili varieties, from smokiness and fruitiness to subtle sweetness. Sauce consumption has grown steadily, with spicy sauce

launches accelerating dramatically, and consumers now actively look for named chili varieties on labels, signalling a desire for authenticity and transparency.

Unexpected flavour pairings are also gaining traction, with combinations like spicy and floral, tangy, or salty creating memorable experiences. This aligns with Asia's culinary heritage, where complex heat profiles such as Sichuan peppercorns or Thai bird's eye chilies are already deeply embedded. At the same time, clean label expectations are rising, with consumers demanding natural ingredients and clear sourcing information. Delivering authentic chili flavour profiles that perform consistently in commercial production requires both culinary insight and technical precision.

Companies are responding with

a multi-faceted approach that integrates consumer-backed research, authentic varietal extracts, application versatility across categories, and collaborative technical support. Their expertise in scaling kitchen innovations into commercial production ensures consistency while meeting clean label requirements. For manufacturers, the opportunity lies in differentiating through ingredient storytelling, varietal claims, and complex flavour builds that go beyond generic “spicy” positioning. As heat preferences evolve, the category is becoming a strategic flavour advantage, offering brands the chance to resonate with consumers who value boldness, authenticity, and transparency in their food choices.

<https://www.foodnavigator-asia.com/https://www.foodnavigator-asia.com/News/Promotional-features/consumer-insights-on-spicy-food-trends/>

## Why Familiarity Drives Texture Acceptance in Food and Drink

Research highlights that consumers are more receptive to new food and drink products when textures align with familiar eating experiences such as sipping, spooning, or sharing.

Familiarity is a critical driver of texture acceptance across APAC, with success in categories like plant-based foods depending on how convincingly textures replicate traditional animal-based qualities such as chewiness or creaminess. Smoothness and

drinkability are especially important in functional foods, where gritty or heavy textures can undermine trust.

Texture strongly influences perceptions of quality and freshness, often before conscious evaluation, making it a powerful driver of product success. Cultural preferences shape expectations: Southeast Asian consumers often associate indulgence with richness and layered textures, while Japanese consumers value smoothness, subtlety, and balance, as seen in lighter soufflé-style cheesecakes.

Brands are increasingly engineering texture as a

strategic design tool to support satiety, indulgence management, and ease of consumption across life stages. Fuller-bodied mouthfeel in reduced-sugar or reduced-fat products can deliver satisfaction without compromise, while smoother textures in fortified beverages help offset chalkiness, particularly for ageing consumers. The study emphasizes that nutrition, taste, and texture must be developed together to ensure health-focused products also deliver emotional satisfaction.

<https://www.foodnavigator-asia.com/Article/2026/02/26/why-familiarity-drives-texture-acceptance-in-food-and-drink/>

## 'Sensemaxxing' With Layered Textures, Bold Flavours and Playful Formats

At Expo West, food brands highlighted the trend of "sensemaxxing," which emphasizes delivering bigger sensory experiences through layered textures, bold flavours, and playful formats..

The Specialty Food Association declared 2026 the year of sensemaxxing, reflecting consumer demand for foods that combine indulgence, functionality, and fun in smaller, calorie-conscious

portions.

Kitchen & Love introduced Sweet Nests, a bite-sized reinterpretation of baklava made with shredded phyllo, nuts, dates, and agave syrup, designed to be less sweet and more suitable for everyday snacking.

Issei reimaged gummies by using tapioca and rice flour to create mochi gummies with a soft, pillowy chew, further enhanced by chocolate coatings that deliver a unique textural contrast.

Mezcla positioned its protein bars as light and crispy, using pea crisp proteins to avoid the dense, chalky textures typical

of the category, while Popnuts combined baked peanuts with a corn coating to create a dual crunch experience.

Together, these innovations illustrate how texture has become a central focus in product development, with brands deliberately engineering mouthfeel to enhance enjoyment, encourage mindful snacking, and differentiate themselves in a market increasingly shaped by health concerns and evolving consumer expectations.

<https://www.foodnavigator-usa.com/Article/2026/03/10/sensemaxxing-makes-every-bite-count-in-calorie-conscious-era/>



## Fermentation-Derived Vanillin for Clean Label Foods

Lallemand Bio Ingredients has introduced Hevani, a natural vanillin ingredient produced through yeast based precision fermentation.

The technology originates from Evolva, a biotech firm acquired by Lallemand in 2024, and enables year round production of high purity vanillin with consistent quality and scalability. Hevani achieves 98% purity, free from contaminants such as pesticides or heavy

metals, and is approved for use in both the EU and US without requiring GMO labelling.

The ingredient is designed for applications across bakery, dairy, confectionery, chocolate, and cereals, offering an intense vanilla taste, enhanced mouthfeel, and improved flavour notes compared to synthetic vanillin. It also carries “natural” status in major markets, aligning with

consumer demand for clean label and sustainable products.

Innova Market Insights data shows strong growth in vanilla based launches globally, with a 79% CAGR between 2023 and 2025, particularly in vegetarian, halal, and gluten free categories.

<https://www.foodingredientsfirst.com/news/lallemand-natural-vanillin-precision-fermentation.html>



## AI-Powered Fraud Detection Tool Could Transform Food Safety In EU

The European Commission has launched Trace Map, an AI powered platform designed to strengthen food safety and fraud detection across the EU.

The tool accelerates the identification of high risk products, unsafe goods, and fraudulent activity, enabling national authorities to act more quickly and effectively.

Trace Map automates traceability mapping, providing detailed visualizations of

complex supply chains and integrating seamlessly with key EU databases such as TRACES, the Alert and Cooperation Network,

and the Rapid Alert System for Food and Feed. This integration improves efficiency, data access, and collaboration among member states.

By leveraging AI, the system reduces reliance on manual checks and speeds up crisis management, helping authorities detect suspicious trade or production patterns before they escalate into foodborne outbreaks. It also supports broader EU agricultural

and consumer protection goals by reinforcing compliance with standards and ensuring unsafe products are swiftly removed from the market.

The initiative reflects the EU’s push for greater transparency and resilience in food systems.

Trace Map’s ability to deliver faster risk identification and coordinated responses positions it as a critical tool for safeguarding consumers and strengthening trust in the food supply chain.

<https://www.foodingredientsfirst.com/news/eu-commission-tracemap-ai-food-safety.html>



## Regulatory Frameworks for Cell-Based Food and Precision Fermentation-Derived Food Products

The FAO Legal Paper No. 114 provides an overview of the

regulatory frameworks and legal issues surrounding cell-based food and precision fermentation-derived food products.

It highlights how these emerging technologies, including cultivated meat, dairy, fats, and

fermentation-derived proteins and enzymes, are creating new challenges for food safety, trade, intellectual property, and consumer protection. At the international level, Codex Alimentarius and WTO agreements are central to shaping standards, but concrete global rules remain in early stages.

Issues of biosafety, intellectual property, human rights, food sovereignty, and environmental law also intersect with these innovations, raising questions about equity, sustainability, and access.

National and regional laws generally rely on existing food safety and biotechnology frameworks, often treating these products as novel food sources or genetically modified foods. While new standalone regimes are not always necessary, clarity is needed on how current rules apply,

particularly regarding labelling, marketing authorization, and consumer rights. Case studies from the United States, European Union, China, Singapore, and others illustrate diverse approaches, from pre-market authorization processes to specific codes of practice for tastings of cultivated foods.

The paper recommends five priority actions: clarifying existing frameworks, evaluating pre-market authorization needs, updating rules on labelling and additives, promoting international

harmonization, and ensuring broad stakeholder engagement. Overall, it emphasizes that legislation is not only a technical matter but also a political and ethical one, shaping how societies integrate these technologies into food systems while balancing innovation, safety, sustainability, and consumer trust.

<https://openknowledge.fao.org/server/api/core/bitstreams/14d075c3-d670-4e46-acc4-0f1b47fcd92/content>

## Wisecode Gives Brands a New Way to Claim They're Non-UPF

Wisecode has introduced a new Non-UPF Shield verification program that allows food and beverage brands to demonstrate they are not ultra-processed under the company's standards.

Built on a database of more than 840,000 products and 15,000 attributes, the app enables consumers to scan barcodes and instantly see whether a product qualifies as ultra-processed, along with explanations of which

ingredients contribute to that classification.

The Non-UPF Shield is a voluntary certification costing \$200 per SKU annually, with discounted introductory offers for smaller brands. Verified products gain visibility in the Wisecode app and with retailers, and participating companies receive branding assets and press kits. The system evaluates products based on the number of processed ingredients, health risks associated with those ingredients, energy derived from added sugars, and the presence of high-risk additives. Products are then categorized as minimally processed,

moderate, ultra, or super-ultra.

Wisecode's approach is designed to provide clarity in a market where definitions of ultra-processed food remain inconsistent. The company plans to expand its certifications and allow consumers to personalize ingredient codes based on dietary preferences or restrictions, ultimately aiming to make food processing more transparent and tailored to individual needs.

<https://www.foodnavigator-usa.com/Article/2026/03/10/wisecode-non-upf-shield-helps-brands-prove-clean-label-claims/>

## APAC E-Commerce: Misleading Claims, Risks and Opportunities

APAC's e-commerce sector is expanding rapidly, but the growth comes with heightened regulatory scrutiny over product claims in food and nutraceuticals.

Industry voices stress that evidence-based claims and scientific validation are becoming essential. In India, for instance, the government is strengthening rules around e-commerce and label claims, creating opportunities for brands that emphasize credibility, clinical backing, and expert endorsements. Similarly, in Australia, non-compliant advertising online has raised concerns, with calls for

stronger enforcement to protect compliant firms. Regulators across the region are tightening oversight, moving e-commerce products closer to the standards applied to domestic goods. While platforms like TikTok remain popular sales channels, they are also rife with exaggerated or misleading claims, which compliant companies warn could undermine consumer trust and fair competition.

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stronger enforcement to protect compliant firms.

Navigating APAC's diverse regulatory landscape requires strategic planning, as definitions, categories, and claims requirements differ widely across markets. Companies often need to adapt product labels, advertising, and claims to meet local standards, particularly in markets like China, where strict safety and

efficacy guidelines govern functional foods. Ultimately, brands that prioritize compliance, authenticity, and consumer trust are best positioned to benefit from the region's fast-growing e-commerce boom, turning regulatory tightening into a competitive advantage.

<https://www.foodnavigator-asia.com/Article/2026/03/15/e-commerce-in-apac/>



EFSA has announced it will deliver a scientific opinion on the health risks of microplastics by the end of 2027, following a request from the European Parliament.

The review will examine how microplastics enter the human body, their transfer into food, and methods for assessing related risks, while also

updating dietary exposure estimates. Current research shows wide-ranging contamination: seafood is a known source, but meat, grains, vegetables, salt, chewing gum, and even teabags have all been found to release significant amounts of microplastics.

Despite these findings, scientists remain divided on the extent of health impacts, with some questioning detection methods and the risk of false positives. In the meantime, industry players are being urged to scrutinize their value chains for contamination points, from water and ingredients to

machinery wear and packaging processes.

Experts caution that plastic-free packaging alone may not solve the issue and could even harm sustainability goals. Instead, strategies such as refusing, rethinking, and reducing plastic use, alongside better monitoring and scientific clarity, are recommended. EFSA's upcoming review is expected to provide much-needed guidance for food safety and industry practices.

<https://www.ingredientsnetwork.com/efsa-to-put-microplastics-under-the-food-safety-news129031.html>



Clean label and functional food trends are both shaping consumer expectations, and while they may seem contradictory, they can coexist.

Functional foods are sought after for benefits such as protein, fibre, and enhanced nutrition, while clean-label products appeal through short, simple ingredient lists and natural cues. Experts note that

these trends serve different consumer needs: some prioritize natural transparency, while others focus on performance and health effects.

Concerns remain about ultra-processed foods, even when fortified with functional ingredients, as highlighted by recent research showing that fortification can mask potentially harmful aspects of processing. Protein bars and similar products have been criticized for heavy use of additives, raising questions about whether functionality undermines clean-label ideals.

The industry is responding by reformulating to align with clean-label demands, showing that functionality and simplicity are not inherently opposites. Younger consumers, in particular, are drawn to naturally functional foods such as Greek yoghurt and whole milk, which deliver benefits without heavy processing. The future of these trends lies in combining functionality with transparency, ensuring that products can deliver health benefits while maintaining consumer trust in their natural composition.

<https://www.foodnavigator.com/Article/2026/02/02/clean-label-vs-functional-foods/>

## The Clean Label Chocolate Revolution Has Begun

Clean label chocolate is emerging as a powerful trend, reshaping how indulgence is defined in confectionery.

The global clean label ingredients market, currently valued at nearly \$48 billion, is projected to reach \$83 billion within eight years, reflecting strong consumer demand for transparency, recognisable ingredients, and minimal processing. Chocolate has traditionally lagged behind other categories due to its reliance on multi-functional structural components, but manufacturers are now finding ways to reformulate without compromising taste or texture.

Major players such as Nestlé, Hershey's, and Mars have committed to removing artificial ingredients and colours, while innovations like sunflower lecithin are enabling cleaner formulations that maintain processing efficiency. Natural sweeteners such as date sugar and maple are also gaining traction, alongside greater emphasis on organic certification, traceability, and credible cocoa sourcing.

The challenge lies in balancing simplicity with indulgence. Reformulation must preserve melt, creaminess, and flavour delivery, making sensory science central to product development. Consumer expectations have shifted dramatically, with clean label chocolate moving from niche preference to mainstream demand. Shoppers now expect

short, simple ingredient lists and transparent sourcing narratives, but taste remains the decisive factor, with 78% of consumers ranking flavour as the most important driver of confectionery choices.

The next phase of clean label chocolate will be defined not only by removing artificial components but by integrating natural, functional, and transparent ingredients in ways that enhance both indulgence and credibility. This evolution positions chocolate as one of the most significant opportunities in the clean label movement, blending scientific progress with consumer trust to redefine the future of the category.

<https://www.foodnavigator.com/Article/2026/03/05/the-clean-label-chocolate-revolution-has-begun/>

## Trace Levels of Food Pathogen Do Not Always Translate to Health Risk, Says Study

A new study published in *Frontiers in Science* argues that ultra-sensitive food safety tests, while designed to protect consumers, may actually drive unnecessary food waste, higher costs, and reduced availability without delivering significant public health benefits.

Researchers emphasize that foodborne pathogens remain a serious issue, causing around 420,000 deaths and 600 million illnesses annually, but they caution against "zero-

detection" expectations. Instead, they propose evidence-based targets for "sufficiently safe" food that balance safety with sustainability and food security.

The study highlights how hazard-based assessments often treat any detection of pathogens, such as *Listeria monocytogenes*, as unacceptable, even at trace levels unlikely to cause illness. This can lead to recalls, wasted food, and excessive reliance on packaging or heat treatments that increase costs and reduce nutritional value.

The authors argue for risk-based approaches that consider dose, exposure, and vulnerable

populations, rather than blanket corrective actions.

They also note that focusing too heavily on end-product testing can divert resources from more effective process controls. Computational tools, AI, and genomics could help regulators prioritize risks more accurately, weighing trade-offs between safety, sustainability, and nutrition. The study concludes that food systems must move toward flexible, risk-based standards that protect public health while reducing waste and environmental impact.

<https://www.frontiersin.org/news/2026/03/17/food-safety-tests-drive-food-waste>

## Unbottling Hydration Drinks: A Need-To-Have or Nice-To-Sell?

Electrolyte hydration drinks are experiencing rapid growth, with the global market projected to reach \$56.4 billion by 2030.

Legacy brands and newcomers alike are launching products that promise "rapid hydration,"

positioning them as everyday wellness solutions rather than niche medical nutrition aids. Unilever’s Liquid I.V. has become a leading example, dominating the U.S. market and driving mainstream adoption.

Despite this momentum, experts argue that most consumers do not need electrolyte-enhanced beverages, as regular fluids like water, tea, or coffee are sufficient for healthy hydration. For the general population, these products may be more about marketing than

necessity, with claims of superior hydration often seen as exaggerated.

However, the trend is not without substance. Athletes benefit from electrolyte replenishment, and a new consumer group—users of GLP-1 medications for diabetes and weight loss—represents a genuine need. These drugs reduce appetite for both solids and liquids, leaving users less hydrated than they should be. This creates a significant opportunity for hydration-focused products tailored to

their needs.

The hydration boom therefore reflects both clever marketing and emerging demand. While many products may be solving a problem that doesn’t exist for the average consumer, the rise of GLP-1 users and the broader wellness movement ensure that hydration drinks will remain a dynamic and expanding category.

<https://www.foodnavigator-usa.com/Article/2026/03/17/hydration-trend-a-long-lasting-trend-of-marketing-fad/>

## Japan Revises Nutrition Label Guidelines with Sodium Control Focus

Japan has introduced new front-of-pack nutrition labelling guidelines with a strong emphasis on sodium control, reflecting the country’s ongoing public health challenge linked to high salt consumption from staples like soy sauce and condiments.

The Consumer Affairs Agency developed these guidelines after extensive consultation with consumers, food businesses, and other

stakeholders, making sodium reduction a central priority. Labels must now convert sodium content into its dietary salt equivalent and highlight this information in a double-lined box to draw consumer attention.

Although currently voluntary, the guidelines are expected to become mandatory if adoption remains slow, as a 2024 survey showed only 16% of products display the required front-of-pack nutrition information. The initiative aligns with the Health Japan 21 strategy, which promotes a healthier and more sustainable food environment.

The guidelines also specify optimal label placement and serving size formats to ensure clarity and accessibility.

By focusing on sodium transparency and encouraging food manufacturers to adopt these standards, Japan is laying the groundwork for regulatory control and fostering innovation in lower-salt products, while signalling that nutrition labelling is a key tool in shaping healthier consumer choices.

<https://www.foodnavigator-asia.com/Article/2026/03/25/japan-revises-nutrition-label-guidelines-with-sodium-control-focus/>

## Are Calorie Counts Wrong or Just Outdated? David Protein Lawsuit Sparks Debate

The lawsuit over David Protein bars is spotlighting a bigger issue than just one brand’s label—it’s exposing the tension between traditional calorie measurement methods and how next generation ingredients behave in the

body.

The bars use esterified propoxylated glycerol (EPG), a fat substitute that mimics fat in food but isn’t fully metabolized like conventional lipids. Plaintiffs argue lab tests show far higher calories and fat than advertised, while the company insists those tests misrepresent metabolizable energy—the actual usable calories absorbed by the body.

At the heart of the debate is

methodology. Standard approaches like bomb calorimetry measure total energy released when food is burned, but that doesn’t always match human metabolism. FDA regulations allow multiple accepted methods for calculating calories, meaning different results can be legally permissible depending on the ingredient’s properties. This flexibility creates a grey zone for novel compounds like EPG, where science and regulation are still catching up.

Experts note that while discrepancies don't automatically mean misbranding, even small gaps between labelled and actual calorie intake can matter over time. The case underscores how innovation in functional foods is

testing the limits of decades old definitions, raising questions about whether calorie counts are outdated or simply incomplete for modern formulations. It's a reminder that transparency and clarity in labelling are becoming just as

critical as the science behind the ingredients.

<https://www.nutraingredients.com/Article/2026/03/24/are-calorie-counts-wrong-or-just-outdated-david-protein-lawsuit-sparks-debate/>

## Sweet Proteins Promise a Sugar Reset but New Questions Are Emerging

Sweet proteins are emerging as one of the most intriguing frontiers in food science, positioned as natural sugar replacements that promise both indulgence and health.

Derived from plants such as *Thaumatococcus daniellii* (source of thaumatin) or *Pentadiplandra brazzeana* (source of brazzein), these proteins deliver sweetness many times more intense than sucrose, yet contribute negligible calories. Their appeal lies in the ability to satisfy consumer demand for reduced sugar products without sacrificing taste, a challenge that has long plagued artificial sweeteners and sugar alcohols. For food manufacturers, they represent a potential breakthrough in reformulating products to meet health guidelines while maintaining consumer acceptance.

Yet their introduction into mainstream food systems raises complex questions. Unlike traditional sweeteners, sweet proteins do not behave like carbohydrates; they interact with taste receptors in unique ways and are metabolized differently in the body. This

complicates how they are classified under existing regulatory frameworks, which were built around conventional definitions of sugar, fat, and calories. For example, standard calorie measurement methods may not accurately capture their negligible energy contribution, creating uncertainty about how they should appear on nutrition labels. This regulatory ambiguity is particularly pressing as global health authorities push for stricter sugar reduction targets in processed foods.

Consumer perception adds another layer of complexity. While "protein" carries positive associations with health, strength, and satiety, the idea of proteins being used as sweeteners may confuse or even mislead shoppers. Transparency in labelling and education will be critical to ensure that consumers understand what sweet proteins are, how they differ from sugar, and why they are safe. Without clear communication, there is a risk that scepticism—already familiar from debates around artificial sweeteners—could slow adoption.

Industry experts see both opportunity and challenge. On one hand, sweet proteins could enable innovation across

categories from beverages and dairy to confectionery, offering a way to reduce sugar without compromising flavour. On the other, integrating such novel ingredients into established systems of food safety, nutrition labelling, and consumer trust requires careful navigation. The debate highlights a broader tension between rapid scientific advances in ingredient technology and regulatory structures that lag behind, designed for a world where sweetness was synonymous with sugar.

Ultimately, the rise of sweet proteins may reshape not only product development but also the very language of nutrition. They force a reconsideration of what "sweetness" means in modern foods, how calories are defined, and how health is communicated to consumers. If successfully integrated, they could mark a turning point in the food industry's efforts to balance indulgence with wellbeing, signalling a future where sweetness is no longer tied to sugar's metabolic costs but to a new generation of science backed, naturally derived solutions.

<https://www.nutraingredients.com/Article/2026/03/20/sweet-proteins-aim-to-replace-sugar-but-raise-new-questions-for-food-industry/>

## Australia And New Zealand to Introduce Mandatory Front-Of-Pack Nutrition Labels

Australia and New Zealand are moving to make front of pack nutrition labelling mandatory through the

Health Star Rating (HSR) system. After years of voluntary uptake falling short of targets—only 39% of intended products

in Australia and 36% in New Zealand adopted the label—food ministers instructed Food Standards Australia New Zealand (FSANZ) to draft legislation requiring all packaged foods to display the HSR. The system uses an algorithm that weighs risk increasing components such as energy, saturated fat, sugars, and sodium against beneficial ones like protein, fibre, and fruit, vegetable, nut, and legume content to generate a star rating.

Public health organisations, including the George Institute, Australian Medical Association, VicHealth, and the Food for Health Alliance, have welcomed the move, arguing that mandatory labelling is

essential to build consumer trust and encourage healthier choices. Surveys show strong public support, with four out of five Australians backing mandatory labelling and many expressing frustration at the confusion caused by existing nutrition panels. Research has demonstrated that interpretive front of pack labels help consumers better understand nutritional quality, though the HSR system was found to be less effective than Nutri Score in identifying the healthiest and unhealthiest options.

The mandatory rollout is expected to take up to 18 months, during which FSANZ will conduct consultations and invite public submissions. While voluntary adoption will

continue during this period, the eventual requirement will compel manufacturers to display HSR on all packaged products. Beyond informing consumers, the system is anticipated to drive reformulation, pushing companies to reduce sugar, fat, and salt in their products to achieve higher ratings. Policymakers and health advocates believe this shift will make healthier options more accessible, improve diets, and contribute to better public health outcomes across both countries.

<https://www.ingredientsnetwork.com/australia-and-new-zealand-to-introduce-mandatory-news129042.html>

## Standing With Science When Nutrition Goes Viral

The article emphasizes how social media has amplified consumer interest in nutrition but often spreads conflicting or misleading messages faster than science can validate them.

It highlights the importance of evidence based guidance, especially in areas like digestive health, where the gut microbiome has become a popular topic. Prebiotics are

used as an example to show why clear scientific definitions matter: not all fibres marketed as prebiotics meet the rigorous criteria of selective

fermentation, proven health benefits, and safety. Chicory root fibre, specifically inulin and oligofructose, is presented as a benchmark ingredient because decades of clinical research consistently demonstrate its effectiveness in supporting beneficial bacteria and digestive function.

The piece stresses that standing with science does not mean rejecting innovation but

ensuring that new products and claims are grounded in robust evidence. In a landscape where nutrition trends can go viral overnight, the deliberate pace of scientific validation is what provides reliability. The message behind World Health Day 2026, “Together for health. Stand with science,” is framed as a call to prioritize credible, science based nutrition advice over hype, ensuring consumers receive trustworthy guidance that genuinely supports long term health.

<https://www.foodmag.com.au/standing-with-science-when-nutrition-goes-viral>

## What's The Best Positioning for Healthy Indulgent Products?

The study by EIT Food and Puratos highlights a significant

shift in how healthier indulgent products should be positioned.

Consumers are moving away from the outdated “guilt free” framing, which feels moralising and artificial, toward messaging that emphasizes

enjoyment, balance, and trust. Shoppers want indulgence that feels natural and wholesome, with recognisable ingredients and transparent claims that build credibility. They are sceptical of abstract or overly functional health claims,

especially when linked to ultra processed cues, and instead respond positively to products that signal authenticity through whole food cues, minimal processing, and simple ingredient lists.

Healthy indulgence is no longer a niche but an expectation, with consumers seeking treats that deliver pleasure and connection while aligning with their health goals. Premium cues, such as elevated visual language and natural sweeteners, help position these products as aspirational rather than compromised. The trend

also reflects a broader cultural shift: indulgence is becoming a designed, curated experience, shaped by digital lifestyles, AI driven personalization, and immersive formats that merge sensory pleasure with convenience and identity. At the same time, indulgence is increasingly tied to emotional wellbeing, resilience, and self care, moving from “guilty pleasures” to “functional pleasures.”

Sustainability and ethics are also central to this reframing. Consumers want indulgence that not only satisfies cravings

but also aligns with their values, creating “low impact pleasure” through upcycled goods, alternative proteins, and environmentally conscious choices. Ultimately, the best positioning for healthier indulgent products is rooted in enjoyment, naturalness, and trust, while integrating holistic wellbeing and ethical responsibility into the experience.

<https://www.ingredientsnetwork.com/what-s-the-best-positioning-for-healthy-indulgent-news128966.html>

measurable health outcomes.

Factor claims that over 95% of its menu avoids ultra processed ingredients, thanks to a strict exclusion list covering refined sugars, seed oils, artificial enhancers, and chemical stabilizers. By investing in a fresh supply chain, the company eliminates the need for additives that typically extend shelf life in conventional ready made meals. Nutritional precision is achieved through data driven processes that ensure consistency in macronutrient content, while chefs and dietitians collaborate to deliver flavour through natural herbs and spices rather than excess salt, fat, or sugar.

Transparency is central to the model, with clear communication about what is excluded — such as parabens, sorbates, benzoates, and nitrates — to build consumer

trust. Packaging innovation also plays a role, with Factor using BPA, BPS, phthalate, and PFAS free trays engineered to withstand high temperatures without shedding microplastics. This approach not only protects food quality but also reduces household food waste by offering pre portioned meals, aligning with sustainability goals.

The broader message is that convenience no longer has to mean compromise. By rethinking supply chains, nutritional standards, and packaging, companies like Factor are setting new expectations for ready to eat meals: real food, clean labels, and measurable health benefits integrated into modern lifestyles.

<https://www.nutritioninsight.com/news/factor-hello-fresh-ready-meals-nutrition-transparency.html>

## Rethinking Ready-To-Eat Meals from Ultra-Processed to Real and Nutritious Food

The article explores how ready to eat meals are being redefined from their reputation as ultra processed, nutritionally poor options into fresh, transparent, and health focused solutions.

Factor, part of HelloFresh, is positioning itself at the forefront of this shift by emphasizing clean labels, precision nutrition, and sustainable packaging. Kaylyn Tolzmann, managing director for Europe, explains that the old “frozen dinner” model prioritized convenience over health, but today’s consumers demand meals that support longevity, lifestyle goals, and