PFNDAI

FOOD, NUTRITION & SAFETY MAGAZINE

BULLETIN OCT 2026

Boosting Fiber Intake Through Innovative Means

Prof Jagadish Pai

Keynote Address

Innovations In Processed Foods – Pathways To Health And Wellness

Mr Bhupinder Singh

Beyond Representation: PFNDAI's Contribution to a Stronger Indian Food System

Dr Shatadru Sengupta

Nutraceuticals: Bridging the Gap between Everyday Diet and Modern Medicine

Ms. Aboli Bhatlawande

Processing of Food Powders and their Challenges

Ms Sanyukta Telange

Fruit Puree Production- Problems and Solutions

Ms Samreen Shaikh

Valorization of Fermentation Waste into Useful Products

Dr. Malathy Venkatesan

The Protein Debate: Adequacy, Quality and Excess in the Indian Diet

Ms Simran Vichare

Report of Nutrition Awareness Activity on "Connecting Foods, Nutrition, and Technology for a Healthier Future"

Ms Anuja Padte

PROTEIN FOODS AND NUTRITION DEVELOPMENT ASSOCIATION OF INDIA

2nd Floor, Mahalaxmi Chambers, 22 Bhulabhai Desai Rd., Mumbai - 26 (India)
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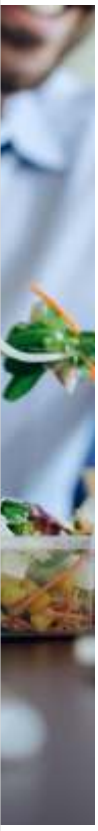
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INDEX

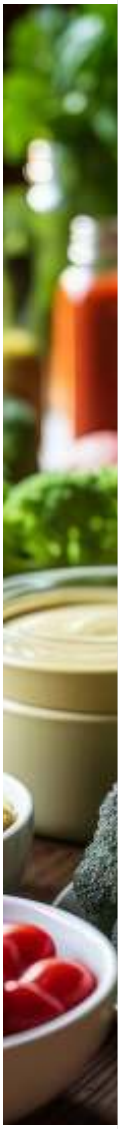




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Editorial
Regulatory Viewpoint By Dr Lewis
From the Executive Director's Desk by Dr. Krishna U. Methekar
Boosting Fibre Intake Through Innovative Means 1
By Prof. Jagadish Pai
Keynote Address: Innovations in Processed Foods – 6
Pathways to Health and Wellness
By Mr Bhupinder Singh
Beyond Representation: PFNDAI's Contribution 9
to a Stronger Indian Food System
By Dr Shatadru Sengupta
Nutraceuticals: Bridging the Gap Between 15
Everyday Diet and Modern Medicine
By Ms. Aboli Bhatlawande
Processing of Food Powders and Their Challenges 21
By Ms Sanyukta Telange
Fruit Puree Production - Problems and Solutions 26
By Ms Samreen Shaikh
Valorization of Fermentation Waste into Useful Products 32
By Dr. Malathy Venkatesan
The Protein Debate: Adequacy, Quality and 38
Excess in the Indian Diet
By Ms Simran Vichare
Report of Nutrition Awareness Activity on 44
"Connecting Foods, Nutrition, and Technology
for a Healthier Future"
By Ms Anuja Padte
Regulatory Round Up 48
By Ms Sanyukta Telange
Research in Health & Nutrition 51
Food Science and Industry News 56
Regulatory News 63



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Back to Basics: Rediscovering the Health Benefits of Pulses

A few days ago, on a LinkedIn post on Soluble Prebiotic Corn Fibre boosting bone mass in teen girls, one very appropriate comment was made. The work was carried out by researchers in the US. The comment was that America seems to be the largest producer of corn. Why not test all fibres? Very relevant question that needs to be considered by our researchers.

West has plenty of funds for research and they use them to study the usefulness of their own resources and publish them in very leading research journals which are then quoted by all globally. We should learn from this. We have natural resources that have been traditionally proven over centuries to be beneficial but very little is published. Regulators want published substantiation. So we need to reinvent all that our ancestors found with their limited resources, so our and global regulators would find it acceptable as proof.

Indian researchers found that if they published in foreign journals their work received more attention as well as credibility, even if it is quite expensive to do so. They also found that if they did research on typically Indian materials the foreign journals looked down upon it and would suggest to authors that they get this work published in Indian journals where it would be more relevant. This was a polite refusal. Although things are slowly changing as some of the Indian botanicals are getting world attention, most of the other things remain the same.

Coming back to the above example of corn fibre, we have so many soluble fibres especially from pulses. They would probably do the similar things to bone mass improvement or may be even better. There has been a lot of work on certain dietary fibre such as inulin that was shown to be lower cholesterol and also control blood glucose rise. This also is possible with soluble fibre from pulses. We take it for granted but regulators need published proof. So we probably need to conduct proper RCT studies and show that it works. There are some studies based on surveys but very few such work is seen.

Even the government and industry should try to promote such research on pulses as funds are meagre for research. The work with health and nutrition needs a lot of funding for analysis with newer fancy instruments. Our technologists should also try to develop ingredients from such common agricultural materials so newer applications could be explored. As globally AI is being used in planning and executing various projects including research, let our researchers also make use of these tools to expedite work in some newer areas that would be beneficial.

We not only need pulses for their fibre contents but also for the protein. Our pulses consumption has gone down over decades and they have become very expensive as food. We need to refocus on increasing pulse consumption for many reasons and all of them are healthy.

Prof Jagadish Pai, Editor, PFNDAI

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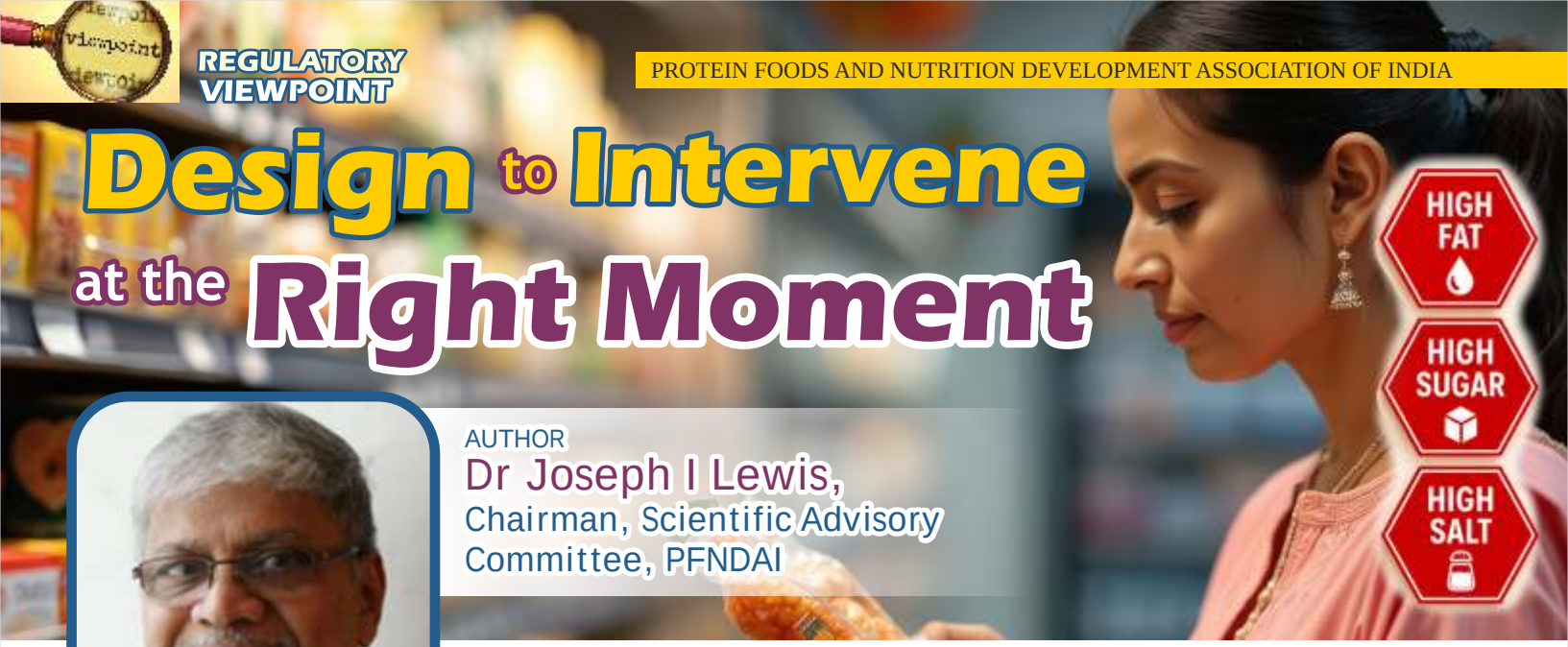
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Design to Intervene at the Right Moment



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

The proposed FoPL red hexagon warning on packaged foods is awaiting finalisation. Meanwhile, several products will attract the symbol, despite their potential nutritional merits.

Dehydrated soup (other premixes) are a case in point, as they trigger high sodium (salt) or sugar levels. People, however, do not eat dry soup powder or drink juice concentrates.

They reconstitute them. As labelled, they are high in salt or sugar, but may not be so when consumed. Forcing a FoPL warning on a pre-reconstituted product may be the current regulatory approach; however, the format has an unexplored scope to reduce salt and sugar as consumed.

Nudge by design:
Intervening at the right moment is a powerful concept in product design. Warning at the point of sale (purchase) merely rings the doorbell; a well-designed product gets a foot in the door. Current FoPL frameworks largely pressure manufacturers to reformulate products below HFSS thresholds or reduce sugar calories with non-nutritive sweeteners: the latter leading to another labelling imposition: " contains sweeteners"
This narrow approach encourages a superficial "health halo" rather than meaningful innovation.

It's a tactic - not a strategy.
Instead of treating food packages as unalterable, they could structurally decouple the food matrix (e.g., noodles, mixes, etc.) from its taste makers' high levels (sodium, sugars, fats): a passive warning turns to an active moment of choice. The aim here is behaviour transformation, not just reformulation.

Imagining better regulations:
Let Industry create formats to intervene at the right moment. Imagine a regulatory system that rewards (grants) an automatic "Green/Healthy" FoPL rating to a dehydrated soup, for example, only if the sodium packet is physically separated: co-packed.

By separating the salt or sugar for adjustable "flavour" the regulation introduces a behavioural friction point. Consumers must now decide how much salt, sugar, or oil to add or fry. Studies show that when forced to add a seasoning, consumers rarely use the full amount. A product strategy that turns health intentions into everyday practice. Regulators could anchor packaging freedoms intended for active engagement.

Reward, not punish: Manufacturers currently fight FoPL because reformulation can ruin a product's shelf stability or its acquired taste; any marketing guru will tell you branding provides whole-of-product value.

Companies can provide healthier options if incentivised and rewarded for "de-bundling" for "adjustable" flavour formats.

If a high-sodium product decouples salt into a separate sachet, the base product should be evaluated independently for its FoPL rating. For example, if the salt is cut by half, the base product (soup or noodles) would receive a better health rating.

To add or not to add becomes a frictional decision. The flavouring sachet labelled with the amount now measures taste. No one has yet uncovered the hidden algorithm that drives consumption behaviour. Nutrition-assembled packaging could be a massive game-changer. However, reshaping public health architecture requires reframing the regulatory approach. The possibility of anchoring legislation to the exact moment of consumption - where NCDs begin - must be seriously explored. NCD risks then become a shared responsibility among regulators, industry and consumers.

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AUTHOR

Dr. Krishna U. Methekar,

Executive Director,
PFNDAI

Dear Members and Industry Colleagues,

India's food and nutrition sector is evolving rapidly, bringing new opportunities alongside increasing scientific and regulatory challenges. Our priority must be to ensure that food safety, consumer trust, and innovation advance together.

PFNDAI will strengthen its role as a credible interface between industry, regulators, academia, and research institutions.

We will promote constructive engagement with FSSAI, BIS, and other relevant bodies, offering evidence-based technical inputs to support practical, transparent, and science-led regulations.

Our focus will include:

* Regulatory Advocacy: Consolidating members' concerns and providing timely, technically sound inputs on draft regulations, standards, and amendments.

* Scientific and Technical Support: Facilitating expert discussions on food ingredients, additives, nutrition claims, fortification, novel foods, and emerging technologies.

* Member Engagement: Strengthening communication, addressing common regulatory challenges, and sharing relevant regulatory updates.

* Capacity Building: Organising technical workshops, seminars, and training programmes to improve regulatory understanding and compliance.

* Research and Collaboration: Encouraging partnerships among industry, academia, laboratories, and research institutions to generate reliable scientific evidence.

* Quality and Consumer Confidence: Promoting good manufacturing practices, robust testing, supply-chain integrity, and responsible product communication.

PFNDAI's strength lies in bringing diverse stakeholders together to develop common, practical solutions. We will work to ensure that industry perspectives are heard constructively, regulatory compliance is strengthened, and responsible innovation is encouraged.

I look forward to the active participation of all members in building a scientifically strong, responsible, and globally competitive Indian food and nutrition sector.

Warm regards,
Dr. Krishna U. Methekar
Executive Director,
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Boosting Fiber Intake Through Innovative Means



AUTHOR
Prof Jagadish Pai,
Editor, PFNDAI

Dietary fibre has been recognised as an essential part of our diet. WHO has recommended 25g per day (1) whereas NIN has recommended between 25 to 50g dietary fibre for adults depending on whether men or women and depending on physical activity (2). Dietary fibre not only helps as prebiotic promoting useful bacteria to be fed in the colon to produce short-chain fatty acids that improves gut health but also helps in passing stool. It is now found that gut health also promotes mental health. Fibre in food also helps satiety so it is helpful in weight control. It controls blood sugar so food does not cause sugar spikes. Thus, adequate dietary fibre intake is very essential.

Indians used to get plenty of dietary fibre as mostly the foods consumed were cereals and pulses along with fruits and vegetable. With changing times, diets also changed and with higher consumption of refined cereal products and prices of pulses, fruits and vegetables sharply rising over years, it has become difficult to consume adequate amounts of dietary fibre.

Fibre intake among Asian women is low as per recent study and in India, average dietary fibre intake is about 15–20/day (3). Another nationwide survey with 8 lakh persons found that 70% of Indians do not meet their daily fibre needs, with women at a greater risk (4).

This presents a challenge to industry that would like the foods to be acceptable but at the same time, it should be higher in dietary fibre in order to make the food products healthier. This also means it is an opportunity for R&D to produce high fibre food products that does not cause problems in processing and also produce products that still are acceptable without textural and/or otherwise mouthfeel impediments.

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Fibre ingredients are many but each having different properties and cannot be directly added to any food without changing the original processing and eating qualities of products. It is very important to choose the proper fibre ingredient and at times treating it during processing to make it amenable, so final product will have both the fibre benefits and also is highly acceptable.

Dietary Fibre Ingredients (5, 6)

Various fibre ingredients used in food production for not just increasing the fibre contents but also for other reasons like increasing viscosity & stabilise emulsion, improving water binding, prolonging freshness, partial replacement of fat, as well as bulking agent. These properties vary for each ingredient depending on their soluble and insoluble fibre content besides their chemical nature including molecular weight. Some insoluble fibre could be converted into soluble by partial enzymic breakdown of the molecule as smaller molecules are more soluble and the viscosity also is lower.

Thus, depending on the final product and its desirable properties, the source and type of dietary fibre will have to be selected. In addition to the processing characteristics, fibre ingredients also affect the sensory qualities of the final food product. It may make the final product tasting grassy, gritty, chewy or hard causing rejection. Thus, it is very important to select the proper ingredient and if necessary, give some pretreatment to make it more acceptable. Some common fibre sources are as follows.

Inulin and FOS (Fructo-oligosaccharides) are prepared from chicory root and are used in dairy, baked goods and beverages. These can partially replace sugar and work as prebiotic. Pectin is prepared from citrus peels and apples and work as gelling agents. Beta-glucan is found in oats and barley and use in bakery products as well as functional beverages. Guar and locust bean gums are obtained from legumes (7). These are commonly used as stabilisers and thickeners in sauces, ice creams and dressings. Some synthetic ingredients like polydextrose and resistant maltodextrins are used in beverages and snacks due to their clarity and lack of taste. These are all soluble fibres (8).

Insoluble fibres are obtained mostly from cellulose and its derived materials from wood pulp or plant cells. Wheat and oat brans also can be source of insoluble fibre that may be added to bakery products like bread, biscuits and in cereals as these provide some grain crunch.

Thus, a combination of soluble and insoluble dietary fibre ingredients would be able to provide the necessary health benefit such as blood sugar control, cholesterol lowering, gut health as well as mental health along with the stool bulk and laxation promotion. The health benefit is not the sole criteria of selection of fibre ingredients as just adding bran to any food product will not work. That would create acceptability problem in many foods, so proper selection of fibre ingredient or a mix is necessary to achieve the proper processing properties as well as sensory properties of the final product. A well-known example is addition of dietary fibre to bread. Simply adding the bran that was removed during refining the wheat flour will not give a good elastic dough to entrap the gas to yield light leavening which upon



baking would make a soft bread. Bran particles would break the dough consistency and cause gas to escape with loss of volume (9, 10).

Fibre Innovation for Healthy & Enjoyable Food Products

Although many consumers may readily suffer and eat food products that are not very flavourful or tasty, but a vast majority would rather eat foods that would be delicious to eat as they reject food products that are not enjoyable. Thus, it is very critical to provide both health benefits along with products they can enjoy.

As different fibres behave differently under processing conditions, proper selection of ingredients is very critical for successful innovation to ensure stability, taste and texture are not sacrificed while trying to provide healthy food products. Soluble fibres are commonly used in beverages due to their ability to dissolve easily, remain stable across pH ranges and avoid unnecessary viscosity. The desirable viscosity could be adjusted by enzymic pretreatment to prepare either pulpy thick or watery thin beverages.

As mentioned earlier, inulin and FOS have sweetness too, so they could not only be used to improve fibre content of foods, but also to reduce the sugar content. This gives a double advantage. FOS, however, has some limitation as it is only half as sweet as sugar and also excess would have laxative effect. So, its application should be carefully observed. It is being used with many high-intensity sweeteners.

Considering the difficulties in adding fibre in many food products that affect the taste, texture, mouthfeel and many other qualities, many companies are going for improving the fibre contents of beverages (11, 12). As the technologies are available to prepare extremely small particles without separation and settling, even insoluble fibre has been added to functional beverages.

It is difficult to prepare high fibre snack foods as consumers are very sensitive to the desirable taste and eating quality of snacks that are consumed more for fun and joy. However, proper use of ingredients could make them healthy too. Use of legumes, especially chickpea, not just increases fibre but also proteins and proper pretreatment like roasting of ingredients would not add undesirable off-flavour. As people have started consuming large amounts of snacks lately, this could be a good way of enriching them with fibre. Multigrain snacks are becoming popular with use of millets that provide fibre along with other benefits. As spicy snacks are becoming globally popular, and as spices contain fair bit of fibre, this may be another way of enriching.

Many cheese-based sauces and spreads are becoming very popular now and these could be made fibre-rich. Many fibre-rich ingredients such as bamboo, acacia, potato or citrus, have been tested successfully with respect to texture, rheological and sensory properties. (13)





In conclusion, changing consumer preferences as well as regulatory challenges could be tackled using some innovative changes in the formulations to include fibre ingredients to improve the nutrition and health without adverse effects on acceptability.

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Keynote Address at the PFNDAI Seminar held on 9th October 2026

Innovations In Processed Foods – Pathways To Health And Wellness

AUTHOR
Mr Bhupinder Singh,
MD & CEO –
Vista Processed Foods Pvt Ltd

Good morning distinguished guests, members of PFNDAI, respected scientists, regulators, industry colleagues, and friends.

It is a privilege to address this esteemed gathering organized by the Protein Foods & Nutrition Development Association of India (PFNDAI). The theme, "Innovations in Processed Foods: Pathways to Health and Wellness," is both timely and highly relevant as the food industry navigates changing consumer expectations, evolving regulations, and unprecedented opportunities for growth.

Today, consumers expect much more from food than simply taste and convenience. They seek foods that are nutritious, safe, sustainable, affordable, and tailored to their individual health needs.

The seminar agenda aptly reflects this transformation through discussions on sugar reduction, fortification, wellness beverages, nutrient protection technologies, scientific substantiation, and regulatory enablers.

Example to communicate is Kurkure snacks from Rice mills Broken rice – extrusions process with corn and gram.





Keynote Address
Innovations in Processed Foods – Pathways to Health and Wellness

India stands at a defining moment in its food journey. Under the leadership of FSSAI, the industry is increasingly focused on preventive food safety systems, science-based regulations, transparency, reformulation, reduction of salt, sugar and fat, enhanced nutrition, and greater consumer trust.

While regulations provide the framework, it is innovation and industry commitment that turn policy into positive outcomes for society.

As manufacturers, we must recognize that food safety and quality are not competitive advantages; they are fundamental responsibilities.

Consumers may appreciate innovation, but they trust brands that consistently deliver safe products.

Every breakthrough in product development, nutrition enhancement, or processing technology must be built on a robust foundation of food safety culture, quality management systems, traceability, and scientific rigor.

Example of Innovation—from Tomato paste plants the skin and seed drying process called Tomato pomace for pet food.

At Vista Processed Foods, and across the wider food industry, we see quality not merely as compliance, but as a business strategy. Strong food safety systems protect consumers, strengthen brands, reduce waste, improve operational efficiency, and support sustainable growth. In a globally connected marketplace, quality is increasingly becoming the passport to opportunity.

India possesses immense strengths: a large agricultural base, a growing food processing sector, world-class scientific talent, and entrepreneurial energy. By leveraging advanced processing technologies, digital traceability, sustainable manufacturing practices, and globally benchmarked quality systems, India can emerge as a preferred food manufacturing and export hub for the world.

PFNDAI has played a valuable role in fostering collaboration among industry, academia, researchers, regulators, and technology providers. Such platforms are essential because no single stakeholder can address the challenges of nutrition, affordability,

Thanks, and Jai Hind.





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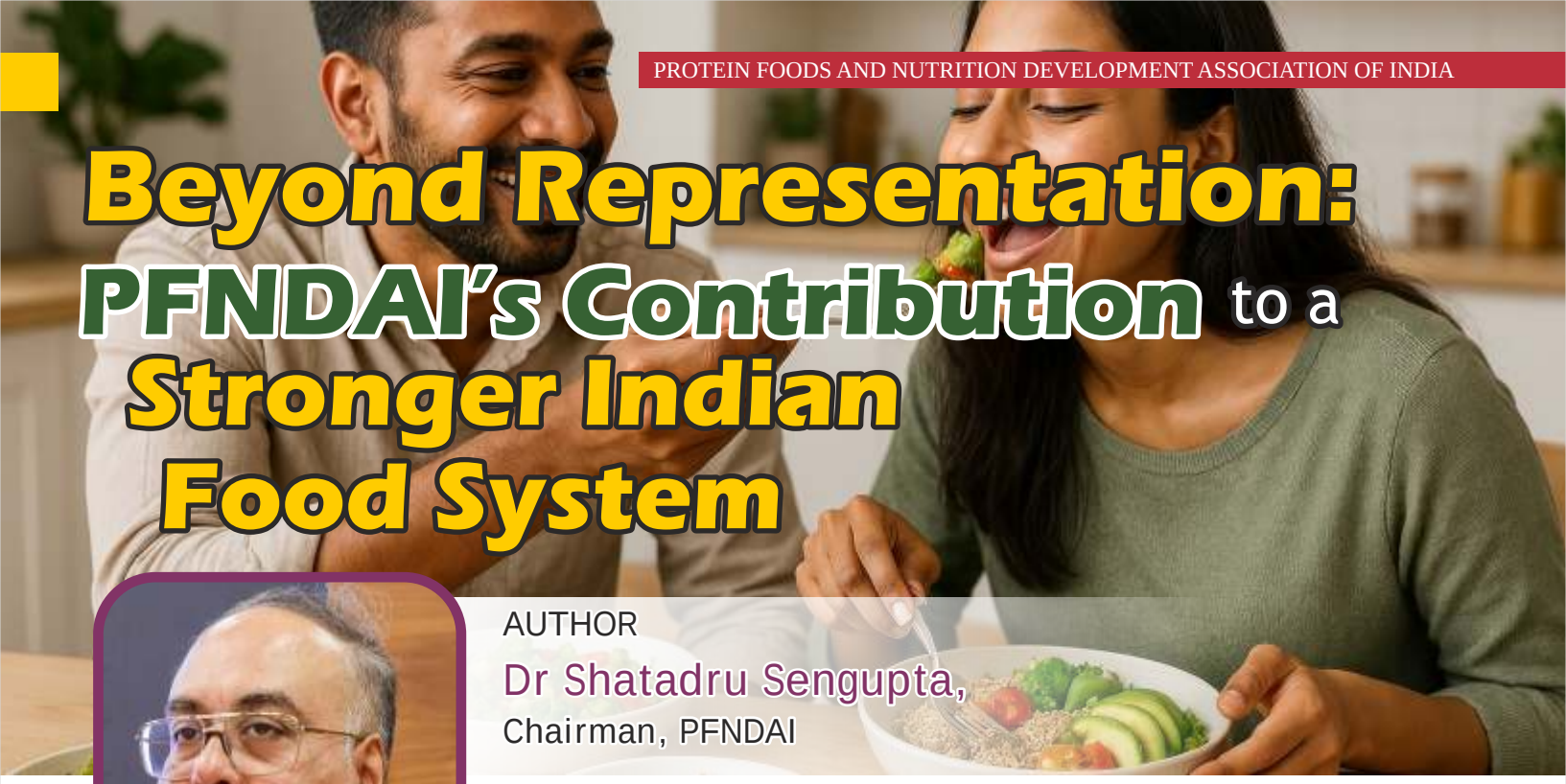
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Beyond Representation: PFNDAI's Contribution to a Stronger Indian Food System



AUTHOR
Dr Shatadru Sengupta,
Chairman, PFNDAI

For decades, PFNDAI has worked not merely to represent the food industry, but to help India understand its contribution, responsibilities and the science behind the food we eat.

Food is among the most basic requirements of human life. Yet ensuring that food is safe, nutritious, affordable and available when and where it is needed is anything but simple.
For a country as vast and diverse as India, the food system is a complex chain involving farmers, processors, manufacturers, scientists, nutritionists, distributors, retailers, regulators and consumers. Each has an important role to play.

The food industry occupies a particularly significant position in this chain. It converts agricultural produce into food that can be safely stored, transported and consumed; extends shelf life; reduces wastage and spoilage; creates employment; supports farmers and allied industries; and makes food available across seasons and geographies.

For several decades, the Protein Foods and Nutrition Development Association of India (PFNDAI) has sought to ensure that this contribution is better understood.

Its work has gone well beyond the conventional role of an industry association. PFNDAI has worked at the intersection of industry, science, nutrition, education, regulation and public awareness, with the broader objective of contributing to a stronger and more informed food ecosystem in India.

Highlighting the Contribution of Food Processing

Food processing is sometimes viewed simply as a manufacturing activity. Its significance, however, is much broader.

India produces enormous quantities of agricultural commodities, but production alone does not guarantee food security. Perishability, inadequate storage, transportation constraints and seasonal availability can result insubstantial wastage and spoilage.

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Processing, preservation, packaging and appropriate distribution can extend shelf life and enable food to travel safely over considerable distances. In this way, the food industry helps ensure that more of what India produces actually reaches consumers.

PFNDAI has worked to create awareness of this important contribution and to encourage a more balanced understanding of the industry's role in food security and reducing food wastage.

The same is true of food safety. Safe food does not happen by accident. It requires technology, trained people, testing, quality control, good manufacturing practices, appropriate packaging and responsible supply-chain management.

The food industry is therefore not merely a subject of food-safety regulation; it is an essential partner in achieving food safety.

PFNDAI has consistently sought to highlight this role and the industry's responsibility towards consumers.

Understanding Changing Dietary Patterns

Indian food habits are changing. Urbanisation, changing lifestyles, increasing incomes, greater mobility, demographic changes and exposure to different cuisines and food products have all influenced what Indians eat.

Understanding these changes is important because nutrition policies and public-health discussions should be informed by evidence about what people actually eat and how their diets are evolving.

PFNDAI has supported surveys and studies examining changing dietary patterns. Such initiatives have contributed to a more evidence-based understanding of food and nutrition.
This is particularly important because nutrition is rarely about one food or one food category in isolation. It is about the overall dietary pattern, balance, variety, quantity and individual nutritional requirements.

By encouraging research and informed discussion, PFNDAI has helped bring greater nuance to conversations about food and nutrition.

Investing in Education and Knowledge

The future of the food industry depends on knowledge.

Food science, nutrition, food technology, microbiology, quality assurance and related disciplines are increasingly important to the safe and sustainable development of the sector.

PFNDAI has therefore also placed considerable emphasis on education and awareness. Its nutrition-awareness programmes have helped disseminate knowledge, while scholarships and educational initiatives have encouraged students to pursue studies in food science and nutrition.

These efforts reflect an important principle: an industry cannot build a better future without investing in people who understand its science.

Supporting education is consequently not merely an act of philanthropy. It is an investment in India's future food ecosystem.

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Bringing Industry's Practical Perspective to Regulation

Another important role of an industry association is to ensure that the practical experience of industry is heard when regulations, standards and guidelines are developed.

There is no question that food regulation is necessary. Consumers must be protected, food must be safe and businesses must be accountable. At the same time, regulation must be science-based, proportionate and capable of being implemented effectively.

A requirement that appears straightforward on paper may sometimes create considerable difficulties when applied to an actual manufacturing process, supply chain, laboratory method, packaging operation or distribution system.

PFNDAI has, over the years, brought such practical difficulties to the attention of regulators and policymakers.

This should not be viewed as an industry-versus-regulator relationship. Constructive industry participation can actually strengthen regulation.

Regulators bring the perspective of public policy and consumer protection. Scientists bring scientific evidence. Industry brings practical knowledge of manufacturing, technology and supply chains. Effective regulation benefits when all these perspectives are considered.

PFNDAI's role has been to provide that industry perspective while keeping the larger objectives of food safety, consumer protection and public health in view.

More Than an Industry Association

There is an important distinction between representing an industry and simply defending it.
A responsible industry association should advocate for legitimate industry concerns while also recognising the industry's obligations towards consumers and society.

PFNDAI's work has reflected this broader approach. Its activities have sought to promote awareness of the industry's contribution, encourage scientific understanding, support education, facilitate informed debate and communicate difficulties arising from regulatory developments.

The underlying principle is that the interests of industry and society are not inherently opposed.

A food business can succeed only when consumers trust the food it produces. Similarly, policymakers need a food industry that is economically viable, technologically capable and able to innovate.

The answer is therefore not less engagement between industry and government, but better and more constructive engagement.





Looking Ahead

India's food system is entering a period of profound change. Climate change, food wastage, sustainability, changing consumption patterns, nutrition concerns, emerging technologies and evolving scientific evidence will all shape the future of food.

Public discussion about food is also becoming increasingly complex. There is a growing need for credible organisations that can bring together industry experience, scientific knowledge and regulatory perspectives and encourage discussion based on evidence rather than assertion.
PFNDAI has an important role to play in this environment.

Looking back at its work, a common thread emerges: creating awareness about the industry's contribution to safe food; highlighting its role in food security and reducing wastage; recognising its contribution to employment; studying changing dietary patterns; promoting nutrition awareness; encouraging education in food science and nutrition; supporting students through scholarships; and ensuring that industry's practical perspective is heard when regulations or guidelines create difficulties.

Taken individually, these may appear to be separate activities. Taken together, they represent something larger—an effort to build a more informed, science-based and responsible food ecosystem in India.

That is perhaps the most meaningful way to view PFNDAI's contribution.
It has been more than a voice for its members. It has helped create dialogue between industry, government, academia and society; encouraged greater understanding of food and nutrition; supported the next generation of food professionals; and highlighted the important role that a responsible food industry plays in India's economic and social development.

Ultimately, supporting a safe, innovative and responsible food industry is also about supporting India's larger goals: food security, reduced wastage, better nutrition, employment, innovation and economic growth.

As India's food system evolves, PFNDAI's continuing role as a bridge between science, industry, regulation and society will be more important than ever.



Nutraceuticals: Bridging the Gap between Everyday Diet and Modern Medicine



AUTHOR
Ms. Aboli Bhatlawande,
Officer – Technical Regulatory Affairs,
Marico Ltd
Email: aboli.bhatlawande@marico.com

Ayurveda is an ancient system of medicine that began during the Vedic Era around 1500 BC, based on the powerful principle that "Food is the first medicine."

It focuses on holistic health by balancing the body's natural energies, known as Doshas, through personalized dietary choices and herbal remedies like Curcumin and Ashwagandha etc. Centuries later, Hippocrates (c. 400 BC), the father of Western Medicine, would echo this exact Eastern wisdom with his famous principle, "Let food be thy medicine and medicine be thy food." By scientifically tailoring meals to a person's unique constitution and the changing seasons, these ancient traditions together established nutrition as the primary tool for healing and long-term wellness.

The three distinct pillars of health and regulation in pre-1989 India, an era when health sectors operated entirely separately. It shows how Traditional Ayurveda relied on natural home remedies, while Western Modern Medicine focused exclusively on synthetic drugs and mass production. Simultaneously, Strict Post-Independence Food Laws like the 1954 PFA Act strictly policed food contamination and safety. During this time, there was no middle ground: food, pharmaceutical drugs, and tradition were kept entirely segregated

- The Global Shift: In 1989, Dr. Stephen DeFelice coined the term "Nutraceutical", creating a new category that bridged the gap between traditional home remedies and manufactured dietary supplements.

Blending "nutrition" and "pharmaceutical." These are defined as “foods or food derivatives that provide medical or health benefits, including the prevention and treatment of diseases, operating under the philosophy of "let food be your medicine." (Chauhan, et al., 2013)

- The Pioneer Movement: During the 1990s, Dr. Muhammed Majeed—recognized as the Father of the Indian Nutraceuticals Industry—led the movement to create standardized herbal extracts (like Curcumin from Turmeric and Ashwagandha) from Indian plants for global markets.


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BREAKFAST CEREAL
Creative Visualization

Regulatory Fragmentations: This sudden overlap of food and medicine created a messy maze of regulatory uncertainty in the 1990s, as authorities struggled to fit these new supplements into old legal frameworks like the Prevention of Food Adulteration Act (1954) and existing drug laws.

- The Global Push: Indian visionaries successfully developed standardized and clinically validated herbal extracts (like Curcumin and Garcinia). These were exported to structured Western Markets, which had clear regulatory frameworks in place—such as the US DSHEA Act (1994), Europe's Food Supplement Directive, and Japan's FOSHU Law.

- The Domestic Situation: Inside India, there was regulatory chaos. Because there was no legal definition for nutraceuticals, these products fell into a confusing middle ground. They were either forced under old laws "As Food" via the Prevention of Food Adulteration Act (1954) or subjected to Strict Chemical Drug Laws meant for synthetic pharmaceuticals, resulting in random registrations and immense confusion for local sellers. Under the Prevention of Food Adulteration (PFA) Act, 1954, regulation was basic, manual, and focused strictly on primitive food contamination checks like weighing grains and inspecting physical goods. The system shifted radically with the Transition to the Food Safety and Standards (FSS) Act, 2006, which led to the creation of FSSAI in 2008. This brought advanced laboratories, science-based product standards, consumer education, and rigorous risk assessments. For the very first time in India, Nutraceuticals were officially defined by law, giving a structured legal home to the herbal extracts and dietary supplements that previously fell through the regulatory cracks.

Classification and Composition

Nutraceuticals are broadly categorized into three chemical groupings:

- Nutrients: Established functions such as vitamins, minerals, amino acids, and fatty acids.
- Herbals: Concentrates or extracts from botanical sources (e.g., Turmeric for anti-inflammatory properties, Garlic for antibacterial effects, etc).
- Dietary Supplements: Reagents serving specific functions like sports nutrition or weight loss.

Understanding Food vs Nutraceutical vs Drug:

Feature	Food	Nutraceuticals	Drug
Law	FSS Act 2006, Sec 3(j)	FSS Act 2006, Sec 22(1)(a)	Drugs & Cosmetics Act 1940, Sec 3(b)
Core Concept	Any substance for human consumption.	Special formulas for specific dietary or physical needs.	All medicines and devices for medical use.
Composition	Processed, raw, or packaged food and drink (excludes drugs /narcotics).	Standardized botanicals, vitamins, minerals, and amino acids within RDA limits.	Chemical/biological compounds, body-altering agents, and medical devices.
Core Purpose	Basic daily dietary intake.	Specific health benefits beyond basic nutrition.	Diagnosis, treatment, mitigation, or prevention of disease.



The review highlights that while dietary supplements are intended to supplement the diet, nutraceuticals place a stronger emphasis on the prevention and treatment of diseases *(Chauhan, et al., 2013)*

Nutraceuticals are essential food constituents that transform conventional foods into health promoters and disease preventers by providing both nutritional benefits and medicinal effects. The health-promoting properties of these foods are driven by the presence of key bioactive compounds, including carotenoids, collagen hydrolysate, and dietary fibres *(AlAli, M., Alqubaisy, M., Aljaafari, M.N., et al. (2021).)*

The global consumption of dietary supplements and herbal medicine products continues to rise significantly. However, their intended usage varies dramatically across national borders, spanning from general well-being to strict medicinal purposes. Currently, there is a distinct lack of international consensus regarding the scope, technical definitions, requirements, and foundational terminology used to classify these health products.

Right now, there is a lot of confusion because both claims to improve health. However, food supplements only add missing vitamins or minerals to your diet. They do not need to prove that they cure anything.

In contrast, nutraceuticals are made from food but work like medicine. They are designed to prevent or delay long-term health problems, acting as a step "beyond the diet, before the drugs." The author says making a nutraceutical should be like making a medical drug. Scientists must first choose a health problem to target. Then, they must test the product in labs and on humans to prove it is safe and actually works *(Santini, A. and Novellino, E., 2017)*

Given the complexities of the modern international supply chain, establishing transparent, science-based quality standards for raw ingredients has become increasingly critical. Concurrently, the sector is experiencing rapid analytical advancements due to the integration of emerging technologies and data science *(S. Thakkar, et al.2020)*

Market Dynamics and Regulation

The global nutraceutical market is substantial, estimated at USD 117 billion, with rapid growth in dietary supplements and herbal products. In India, the industry has seen a CAGR of 18%, driven by functional foods and beverages. *(AlAli, M., Alqubaisy, M., Aljaafari, M.N., et al. (2021))*

To manage this growth and ensure consumer safety, regulatory frameworks are critical. In the US, the DSHEA (1994) governs these products. Ensuring science-based standards and curbing misleading claims.

Herbal nutraceuticals offer a potent, low-side-effect alternative for managing acute and chronic nutritionally induced diseases. The authors conclude that strategic collaboration between health professionals and regulatory toxicologists is essential to standardize the industry and maximize therapeutic benefits for human longevity and quality of life *(AlAli, M., Alqubaisy, M., Aljaafari, M.N., et al. (2021))*



In India, the Food Safety and Standard Act (2006) was enacted to unify various laws and create the Food Safety and Standards Authority (FSSA),

FSSAI Regulatory Definitions:

Foods for Special Dietary Uses /Functional Foods /Nutraceuticals / Health Supplements *[FSS Act Section 22, (1)(a),(b)]:*

These are foods specially formulated to meet particular physical, physiological, or disease-related dietary needs, differing significantly from ordinary foods *(1)(a)*.

They cannot be presented as conventional foods (1)(b)(i) and must be administered orally in forms like powders, granules, tablets, capsules, liquids, or jellies *(1)(b)(I)*.

Permitted ingredients include plants/botanicals, vitamins, minerals, proteins, amino acids (not exceeding Indian RDA), enzymes, animal-origin substances, or general dietary substances *(1)(a)(I,ii,iii,iv)*. They strictly exclude parenteral forms, drugs (under the Drugs and Cosmetics Act), narcotics/psychotropic substances, and schedules E/EI components. Crucially, they cannot claim to cure or mitigate any specific disease, only allowing general health promotion claims *(1)(b)(i)(ii)(iii)(iv)*.

Conclusion –

Nutraceuticals act as a powerful health bridge, offering the preventive benefits of everyday food backed by the scientific power of modern medicine.

Packed with active ingredients like dietary fibres and plant extracts, vitamin and mineral supplements these products help protect our bodies against long-term illness before prescription drugs become necessary.

Ultimately, they serve as the definitive bridge between food and medicine—positioning themselves as one step ahead from food and one step early to the medicine!

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Processing of Food Powders and their Challenges



AUTHOR
Ms. Sanyukta Telange,
Food Technologist and Regulatory Support,
PFNDAI

Milk powder, flour, starch, spices, coffee, cocoa, whey protein and fruit and vegetable powders are valued for their convenience, ease of transportation, storage, and use in food formulations.

They are incorporated into bakery products, confectionery, dairy foods, instant beverages, soups, and premixes. Despite their advantages, producing and handling food powders presents challenges. Processing conditions, moisture exposure, storage environment, and packaging can influence flowability, stability, nutritional quality, microbiological safety, and performance during reconstitution.

How Are Food Powders Produced?

Liquid foods and concentrates can be converted into powders by methods such as spray-drying and freeze-drying. In spray-drying, a liquid feed is atomized into droplets that dry rapidly in a heated chamber. It is widely used for dairy ingredients and fruit-based products, although heat exposure and the composition of the feed can influence yield, colour, aroma, and heat-sensitive nutrients. Freeze-drying removes water from a frozen product by sublimation under reduced pressure. It can help preserve some heat-sensitive compounds, but it is more cost-intensive. Drum-drying is suitable for viscous or high-solids materials. The preferred method depends on the product, its composition, the required powder properties, and processing constraints.

Solid ingredients may be crushed or milled to reach the required particle size, then screened to remove oversized material and blended to distribute ingredients uniformly. Milling conditions need to be controlled because size reduction requires energy and may generate heat and dust (1).

Major Processing Challenges

Poor flowability

Powder flowability refers to how easily a powder moves through processing equipment. Poor flowability can cause clumping, blockages, and reduced production efficiency (1). Fine particles stick together more easily, and moisture further reduces the flow. For example, oregano, skim milk, sodium caseinate, and whey protein concentrate showed reduced flowability as moisture content increased.



^6 Strength Nutrients' is a reference to the combination of Vitamin D, Zinc, Iron, Vitamin B12, Vitamin A and Vitamin C that are known to support Physical Strength, Mental Strength, and Immune Strength. Refer to the pack for more details.



However, the effect varies between materials: paprika showed high flowability at low moisture levels, whereas aspartame exhibited maximum flowability at 4.57% moisture content. It was also found that water activity predicted flowability more accurately than moisture content for starch and maltodextrin powders, as it reflects how water interacts with the powder. Therefore, controlling humidity and storage conditions, optimizing particle size, and monitoring both moisture content and water activity can help improve powder flow and processing efficiency (2).

Caking and agglomeration

Caking occurs when powder particles stick together to form hard lumps, often due to moisture absorption, temperature changes, etc. For instance, fruit powders become sticky mainly due to sugars and organic acids that absorb moisture, leading to caking and poor flowability. High humidity, temperature, and unsuitable packaging can further reduce their storage stability. This can create difficulties during storage, handling, processing, and reconstitution. Caking can be reduced through appropriate moisture control, suitable packaging, and the use of permitted anticaking agents where necessary. Anticaking agents are mixed into powdered, granulated, or dried foods to absorb excess moisture or coat particles, preventing lump formation and maintaining a free-flowing state, reducing caking and maintaining product quality.

A study on spray-dried apricot powder found that tricalcium phosphate (TCP) and silicon dioxide (SiO_2) improved powder stability and shelf life. TCP was more effective, reducing moisture-related caking and extending the predicted shelf life to 157 days under ambient conditions, compared with 137 days for SiO_2-treated powder (3).

In contrast, controlled agglomeration is an intentional process in which smaller powder particles are joined to form larger, more porous particles. This improves flowability, wettability, dispersibility, and solubility while reducing dust formation. Agglomeration can be achieved through compression, which brings particles together using mechanical pressure, or wet processing, in which a small amount of liquid binds the particles.

Common food powder agglomeration technologies include fluidized-bed agglomeration, which improves the instant properties of milk powders; steam-jet agglomeration, used for instant cocoa products; and spray-drying agglomeration, used in milk powders and instant coffee.

These methods improve powder handling and reconstitution, depending on the material and processing conditions (4). However, selecting suitable agglomeration methods is essential. For instance, fluidized-bed agglomeration may be unsuitable for foods rich in carbohydrates and organic acids, as it can cause excessive stickiness and reduce product yield (1).

Dust generation and segregation

Fine dust can cause product loss, cleaning difficulties, worker exposure, and, under certain conditions, explosion hazards. Dust accumulation may also increase the risk of cross-contamination between products. Appropriate processing and dust-control measures can minimise dust generation during powder handling.



These risks can be further reduced through regular equipment inspections, effective housekeeping, and employee safety training (5). Segregation occurs when ingredients in a blended powder separate during handling or transport. Differences in particle size, shape, improper handling or mixing can contribute to this separation, potentially causing non-uniform ingredient distribution. Careful formulation, blending, and controlled transfer can help reduce this risk.

Loss of nutritional and functional quality

Drying and storage can change colour, aroma, nutrients, and functional properties. Heat-sensitive vitamins and bioactive compounds may be reduced by some processing conditions. In fat-containing dairy powders, lipid oxidation can generate undesirable flavours and reduce sensory quality. Oxidation is influenced by factors including fat composition, oxygen exposure, light, heat, and storage conditions. Process selection and packaging should therefore be based on the properties most important to the particular powder rather than moisture reduction alone.

Microbiological safety

Food powders, including milk powder and spices, can be contaminated with pathogens such as Salmonella. Although low water activity limits microbial growth, it does not necessarily destroy microorganisms, which may survive in dry conditions.

Contamination is particularly concerning when powders are added to ready-to-eat foods after cooking, as surviving pathogens may grow when sufficient moisture becomes available. Commonly used decontamination methods include steam treatment, irradiation, and fumigation, but these may affect flavour, colour, and other quality attributes.

Non-thermal methods such as ozone, cold plasma, and UV-C light show potential for reducing microbial contamination in spices and food powders. Ozone treatment reduced fungal counts in dried herbs by 96–98% but also reduced essential oil content in chamomile and peppermint. Cold plasma reduced bacterial counts in pepper powders by 99.5% after 10 minutes, while longer treatments could affect colour. UV-C LEDs also reduced microbial levels in powdered seasonings, but their effectiveness was limited by particles shielding microorganisms from the light. Therefore, treatment conditions must be optimized to balance microbial reduction with the preservation of product quality (6).

Poor reconstitution properties

Reconstitution performance is an important quality attribute of powders intended to be mixed with liquids. It involves four distinct properties: wettability (how readily liquid contacts and penetrates the powder), sinkability (how easily particles sink below the liquid surface), dispersibility (how evenly particles distribute), and solubility (how readily soluble components dissolve). A powder may perform well in one property but poorly in another.

Reconstitution is influenced by particle size, porosity, density, surface composition, agglomerate structure, and formulation.





Excipients such as maltodextrin, sucrose, and sodium caseinate can improve rehydration, while larger sugar particles may improve cocoa powder rehydration depending on sugar type and size.

Processing methods such as milling and agglomeration can modify particle size and structure, while freeze-drying generally produces more porous powders than spray-drying. However, a balance between porosity, which promotes water penetration, and density, which supports sinkability, is important.

Surface modification can further improve reconstitution. Removing free surface fat reduces hydrophobicity, while lactose and lecithin coatings can enhance wettability; lecithin has also improved the solubility of whey protein isolate and skim milk powder.

Cold plasma can modify particle surfaces to improve wettability, and microencapsulation can protect hydrophobic ingredients and improve their dispersibility and stability.

In addition, nanoparticle systems using materials such as casein, polysaccharides, and porous starch can improve the solubility or bioavailability of poorly water-soluble ingredients. Overall, the most suitable approach depends on the powder's composition and intended use (7).

Conclusion

Food powder processing involves several challenges that can affect product quality, stability, safety, and functionality. Addressing these challenges requires a combination of techniques, effective moisture and environmental control, suitable packaging, and well-designed handling and storage practices.

Processing strategies must be selected according to the composition and intended application of each powder, as no single method can address all quality concerns. Continued improvements in processing technologies, quality monitoring, and storage management can help produce food powders that are safe, stable, consistent, and suitable for their intended applications.

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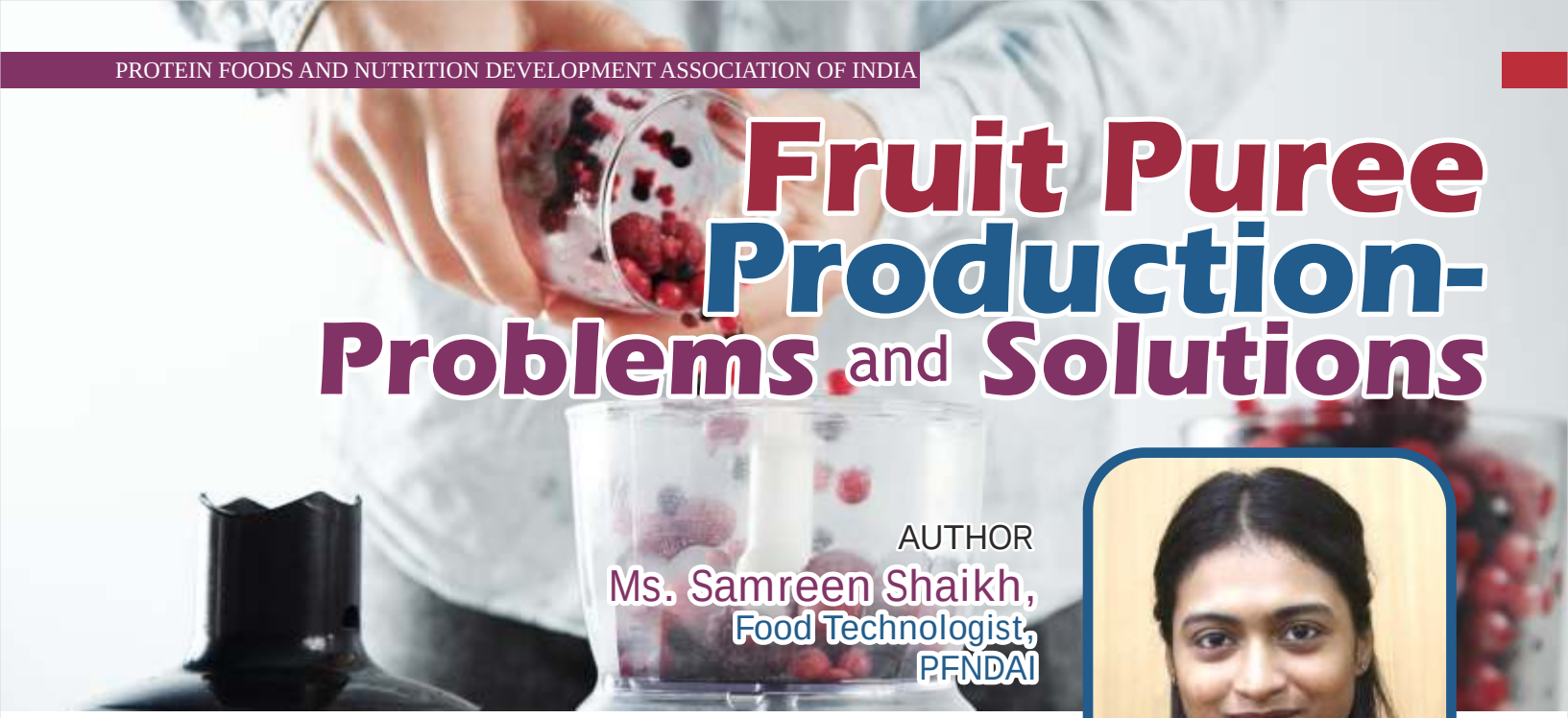
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Fruit Puree Production- Problems and Solutions

AUTHOR
Ms. Samreen Shaikh,
Food Technologist,
PFNDAI

Fruits are valued for their natural sweetness, vibrant colours, refreshing flavours, and nutritional benefits. To preserve their goodness and extend their availability, they are processed into puree, a smooth, pulpy product made by mashing, blending, or sieving ripe fruits after removing seeds, stems, and skins.

Unlike clear fruit juices, purees retain more natural fibre and are widely used in smoothies, bakery products, desserts, sauces, and baby foods. However, challenges such as browning, nutrient loss, microbial growth, and changes in taste and texture can affect their quality, safety, and shelf life.

Overcoming these challenges through suitable processing methods and innovative technologies is essential to producing safe and high-quality fruit purees.

From Fresh Fruit to Puree: Understanding the Processing Flow

Harvesting and Reception - The production process begins with selecting fruits at the appropriate stage of ripeness. The harvested fruits undergo inspection before being stored in bins and transported to the processing plant. Upon arrival, they are unloaded using suitable receiving systems and directed for washing and sorting. Depending on the fruit variety, peeling and removal of pits may also be required.

Extraction, Filtration and Homogenisation - The prepared fruits are crushed using suitable equipment to extract the pulp. Seeds and other unwanted materials are removed through straining or filtration. Homogenisation may also be carried out to achieve a uniform consistency. For fruits that are sensitive to oxidation, deaeration helps remove air and minimise colour changes before packaging.

Pasteurisation - Heat treatment is an important step in fruit puree production. Flash pasteurisation involves heating the puree briefly at a high temperature to reduce microorganisms and improve product safety. The puree is then cooled rapidly before further processing and packaging.

Packaging and Storage - Fruit puree is commonly packed in aseptic bags and suitable containers to protect it during storage. Proper storage conditions are essential for maintaining its colour, flavour, aroma, and texture.



The shelf life depends on the processing method, packaging system, and storage conditions.

Major Problems in Fruit Puree Production and Their Solutions

Fruit puree production involves several challenges that can affect product safety, quality, consistency, and shelf life. From handling raw fruits to processing, packaging, and storage, each stage requires proper control to minimise losses and maintain the natural characteristics of the fruit.

Enzymatic Browning and Colour Loss - Exposure to oxygen during processing and storage can cause oxidation, browning, colour changes, and nutrient loss. Excessive mechanical stress during extraction may also affect the puree's natural colour, aroma, and flavour. These effects can be reduced through gentle extraction methods, cold extraction technologies, deaeration, sealed containers, and limited exposure to air.

Microbial Spoilage - Microbial contamination may occur during fruit handling, processing, and storage. Poor cleaning, inadequate hygiene, and improper storage can encourage microbial growth and affect product safety. Thoroughly brushing and washing fruits, maintaining sanitation throughout the production line, and applying suitable pasteurisation or sterilisation treatments can help control microorganisms. Aseptic filling with sterilised packaging and equipment also helps prevent recontamination.

Loss of Nutrients and Bioactive Compounds - Heat, oxygen, light, and prolonged processing can reduce vitamin C, B vitamins, polyphenols, and natural antioxidants. Cutting, crushing, and pulping expose fruit tissues to oxygen, while excessive heat may damage sensitive nutrients.
Nutritional losses can be minimised by reducing processing delays, limiting exposure to oxygen and light, and carefully controlling heat-treatment temperature and duration.

Inconsistent Texture and Product Quality - Differences in raw materials and extraction conditions can cause variations in colour, aroma, taste, and texture between batches. Inadequate removal of skins, stems, and seeds may also introduce unwanted residues, pigments, or bitter compounds. Selecting suitable processing technologies and conducting pilot trials can help establish reliable processing conditions and improve product consistency.

Temperature Fluctuations - Correct temperatures during storage and transportation are essential for maintaining puree quality.

Fluctuations in refrigeration or freezing conditions, improper thawing, and breaks in the cold chain can affect texture and flavour. Consistent temperature control and regular monitoring during storage and transport can help prevent quality deterioration.

Improper Packaging and Storage Conditions - Unsuitable packaging and poor storage conditions can affect the colour, flavour, texture, nutritional value, and safety of fruit puree.

Food-grade packaging that is suitable for the intended storage conditions should be used, including aseptic packaging for products requiring extended storage without refrigeration.



Dairy Based Beverage Mix (1, 2,3) Proprietary food.
*50% less added sugar as compared to previous formulation of Complan New Royale Chocolate Flavour. *Based on clinical study published in Ind. J.Nutr.Dietet.,(2008). Refer Individual pack for use and other mandatory declarations, Mnemonics are for creative visualization, ®Registered Trademark.



Clean, dry, and well-ventilated storage areas, controlled temperature and humidity, and protection from heat and direct sunlight can help preserve quality and extend shelf life.

Emerging Technologies

Fruit puree production is evolving through technologies that aim to improve extraction efficiency, microbial safety, colour retention, texture, nutritional quality and energy efficiency.

Flash Vacuum Expansion is an emerging technology that combines rapid steam heating with instantaneous decompression under vacuum to produce fruit puree. The process includes six steps: blanching, pasteurisation, mashing, cooling, deaeration and pulping.

Heating is achieved using a screw-conveyor blancher with direct steam injection, while the subsequent operations are synchronised using vacuum conditions and double-valve airlocks. By integrating several processing steps, FVE offers a potential approach for small- and medium-scale fruit-processing industries seeking efficient production of high-quality purees.

Cold extraction technology provides an alternative to conventional hot extraction by processing cleaned fruits at normal temperature using specialised pulping equipment. The system typically consists of a feeding screw, a high-speed beating rotor and a stainless-steel screen.

During processing, the fruit pulp is separated from peel, stalks, seeds and other unwanted components, while the screen size can be adjusted to obtain different puree consistencies. It reduces the activity of enzymes such as polyphenol oxidase, peroxidase, etc., helping minimise enzymatic browning and retain the fruit's natural colour.

A nitrogen-protection system may be incorporated to limit oxidation. Cold extraction is applicable to fruits such as mango, kiwi, berries, pumpkin and tomato. For products that do not undergo thermal treatment during processing, high-pressure processing (HPP) is a non-thermal option for microbial control and shelf-life extension.

Ultrasonic processing is a developing approach for improving the physical and sensory properties of fruit and vegetable purees. It uses high-frequency sound waves to promote mixing, homogenisation and structural modification of the food matrix.

It can improve texture and viscosity by facilitating the release of intracellular sugars, carbohydrates and fibres. This can produce a smoother, creamier and more consistent puree while reducing unwanted graininess, settling and phase separation.

Ultrasonic treatment may also help minimise heat exposure and retain sensitive nutrients and flavour compounds. It can be applied to batches or integrated into continuous, in-line processing systems, offering flexibility for different production scales.





Non-thermal technologies are gaining attention in fruit puree production because they can improve microbial safety while helping preserve natural colour, flavour, texture and heat-sensitive nutrients. Key technologies include high-pressure processing, pulsed electric fields (PEF), ultrasound, cold plasma and ultraviolet irradiation.

HPP uses pressures of up to 600 MPa to inactivate microorganisms while retaining heat-sensitive nutrients and flavour compounds. PEF disrupts microbial cell membranes, while ultrasound uses cavitation to inactivate microorganisms and enzymes and enhance the extraction of bioactive compounds.

Cold plasma generates reactive species that can inhibit enzymes associated with browning, whereas UV irradiation offers another approach to microbial control. Combining technologies, such as ultrasound with HPP or PEF with UV, may improve microbial inactivation.

Future Outlook

The future of fruit puree production appears promising, driven by increasing demand for natural ingredients, convenient foods and fruit-based products across the food and beverage industry.

The global fruit puree market is projected to grow from USD 6.245 billion in 2024 to USD 12.663 billion by 2035, at a compound annual growth rate (CAGR) of 6.7%; these forecasts indicate positive growth prospects.

Beverages, including juices, smoothies and functional drinks, are expected to remain important applications, alongside baby food, bakery products, dairy products, snacks, ice creams and desserts. Growing consumer interest in natural, organic and clean-label foods may further encourage manufacturers to develop fruit purees with natural fruit content and diversified formulations.

Future industry development may also benefit from investment in automation, digital traceability, cold-chain logistics, sustainable sourcing and environmentally responsible packaging. However, challenges such as seasonal fluctuations in fruit availability, raw-material costs, supply-chain disruptions, trade restrictions and food-safety requirements may affect production and market expansion. Therefore, improving processing efficiency, maintaining consistent product quality, strengthening supply chains and developing innovative formulations will be important for the long-term growth of the fruit puree industry.



Conclusion

Fruit puree production offers several advantages over marketing whole fruits, particularly because ripe fruits are highly perishable, seasonal, and vulnerable to physical damage during transportation and storage. Processing them into puree helps reduce post-harvest losses, extend their usability, ensure year-round availability, and create value-added ingredients for the food industry.



Compared with clear fruit juices, purees generally retain more dietary fibre, pulp, and naturally occurring fruit components, providing a thicker consistency and fuller flavour.

The quality of fruit puree is determined by several attributes, including colour, flavour, aroma, texture, viscosity, consistency, nutritional composition, microbial safety, and shelf life. While tomato puree is widely recognised, a variety of other fruit purees, including mango, banana, apple, guava, papaya, peach, pear, strawberry, and passion fruit, are also used in beverages, bakery products, confectionery, dairy products, sauces, and infant foods.

These purees offer food manufacturers versatile ingredients that support product innovation while making better use of seasonal fruit resources.

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Valorization of Fermentation Waste into Useful Products

AUTHORS
Dr.Malathy Venkatesan,
Project Coordinator,
PFNDAI

Fermentation is an ancient process that is widely used in the food industry to produce vinegar, bread, alcoholic beverages, fermented dairy products, fermented soy-based foods, fermented vegetables and cereals.

The utilization of food and agricultural industry waste streams to develop high-value products for commercial applications has become increasingly economically viable. Biomass residues after fermentation have a high content of sugars, starch, proteins, cellulose, hemicelluloses, or lignocellulosic content. Among the fermentation products, the grain alcohol industry, the cheese industry and fermented food industry stand out as major sources of waste for utilization into commercial products.

Grain alcohol industry

Wastes in alcoholic beverage production can vary in form and nature, depending on the particular beverage produced. The main solid by-products of the beer industry, including brewers' spent grain (BSG), brewers' spent yeast (BSY), and brewers' spent hop (BSH). BSY is used as animal feed due to its high protein content. A large part of BSG with high non-starch polysaccharides is used for animal feed. BSG and BSY, can be processed through anaerobic digestion to produce methane (CH4), hydrogen (H2), or a mix of the gases. Recent studies of the surface characteristics of brewer's sludge yeast have demonstrated its potential for the adsorption and removal of inorganic pollutants from waste water as studied with Congo Red. Zeolite was functionalized with spent yeast from a microbrewery to recover platinum group metals from an aqueous solution. Another application of BSY is utilization as carrier material to encapsulate bioactive compounds, like carotenoids or curcumin. BSY cell wall components such as β-glucans and mannoproteins were the main encapsulation agents. In a study, the nutritional quality of BSY could also be enhanced with fermentation using *Propionibacterium freudenreichii*. The process improved essential amino acids, vitamin B12, and the short-chain fatty acid content of BSY (1)



Distiller's grains are solid mixtures that remain after the fermentation of cereal grains by yeast into alcohol. Solubles left over from fermentation usually are added to the distillers' grains before drying, resulting in the product distillers' dried grains with solubles (DDGS). DDGS has 1.8 times greater protein value than soybean meal with highly digestible and rapidly fermentable fiber which makes it suitable as animal feed and aquaculture feed. It is primarily composed of kernel husk, pericarp, and seed coat, making it a rich source of carbohydrates, proteins, lignin, phenolic compounds, lipids, and minerals. DDGS and its intermediate products are directly fractionated into valuable components such as xylo-oligosaccharides, protein, phenolic acids, oils, and phytosterol. DDGS contains various volatile constituents that produce diverse aromas. The main aromatic constituents of DDGS appeared to be esters and acids, including hexanoic acid, butyric acid, ethyl hexanoate, ethyl butyrate, hexyl hexanoate, and butyl hexanoate. Proteins in DDGs mainly consist of globulin, gluten, alcohol-soluble proteins, and glutenin. DDG oil is a good source of carotenoids, particularly lutein, β-cryptoxanthin and zeaxanthin. (2)

Several studies explored the potential use of DDGS in human food applications, specifically in breads, pastas, cookies, and extruded food products. Cornbread with DDGS had higher volume in the loaf and softer texture than the control sample. A lower glycemic index was reported in pita bread incorporated with DDGS and chickpea, individually or in a mixture compared to the recipe containing 100% wheat flour. Incorporating DDGS into PHA (polyhydroxyalkanoate) produced a biodegradable biocomposite with suitable mechanical properties for sustainable plastic applications. (3). DDGS from corn-based ethanol process is a good source of zein (12% of the dry mass [w/w]) depending on corn variety and processing methods. Hydrolytic enzymes have been shown to increase the purity of zein extracted from DDGS to produce a smooth and clear film. Xylan is present in DDGS, which can be used to produce functional products like xylo-oligosaccharides, xylitol and furfural. Microbial fermentation of DDGS results in production of organic acids such as succinic acid, fumaric acid, and lactic acid, acetone, methane, hydrogen, and many other value-added products. (4)

Valorization of cheese industry waste

Cheese is a milk-fermented product obtained by coagulating casein by treatment with lactobacillus and subsequent enzymatic or acid treatment. This is followed by whey drainage and maturation in a controlled environment. Whey, a major by-product of cheese manufacturing, is of significant importance to the dairy industry due to the large quantities generated and its rich nutritional composition. The ultrafiltration process produces a whey permeate rich in lactose. Advances in processing technology, including ultrafiltration, microfiltration, reverse osmosis, and ion-exchange, has resulted in development of several finished whey products: whey protein concentrates (WPC) containing between 50 - 85% protein on a dry basis, whey protein isolate (WPI) containing between 90-98% protein reduced lactose whey, demineralized whey and hydrolysed whey.



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Cheese whey was used as substrate in the production of xanthan gum with optimized high gum production in a bioreactor and at a wide range of viscosity values. (5)

The ultrafiltration membranes retain molecules and particles of high-molecular weight (whey proteins); whereas, the permeate is basically composed of water, salts and lactose. The fraction containing lactose is then subjected to a drying process, such as spray drying to obtain lactose powder.

Lactose provides numerous functional benefits to food formulations due to its physicochemical and functional properties. It possesses solubility, acts as a bulking or flow agent in dry mixtures. It also enhances colour, flavour and texture, helps browning processes and can be directly compressed into tablets. It is typically employed as food ingredient in dairy, bakery, snack, confectionery, and other food and nutritional products (table 1).

In the food industry, lactose performs multiple technological functions. It acts as a free-flowing agent and a non-hygroscopic carrier in dry blends, facilitates the absorption and enhancement of flavour and colour, and contributes to colour and flavour development through Maillard reactions. Lactose is used as a natural source of carbohydrate energy in infant formulas and serves as a functional carrier in the pan-coating of confectionery centres and in tablet manufacturing. (6)

Acetic, propionic, lactic, lactobionic, citric, gluconic and itaconic acids can be obtained from lactose/whey fermentation. Polylactic acid is a biodegradable polyester made by condensation of lactic acid monomers. Due to its low toxicity, it is classified as GRAS and can be also used in food packaging. Lactose has been used in fermentation processes using Lactobacillus species to produce lactic acid.

Table 1: Applications of lactose from whey (6)

Type of product	Application
Baked goods	Breads, Cakes, Cookies, Doughnuts, Muffins, Rolls and biscuits, Pie crusts and fillings
Confectionery products	Candies, Chocolate, Chocolate coatings and other icings
Dairy products	Processed cheeses, Cream cheeses, Cheese spreads, Ice cream, Frozen desserts, Yogurt, Sour cream, Dairy-based beverages, Cultured beverages, Sweetened condensed milk
Meat products	Ham, Sausages, Beef patties
Nutrition products	Infant formula, Sport beverages, Dried nutritional beverage mixes, Meal replacement beverages
Pharmaceuticals	Tablets
Cosmetics	Skincare products, Hair products, Soaps, Lotions

Table 2: Value added compounds recovered by the valorization of fermented food byproducts and wastes (7)

Fermented product	Biomass Resource	Bioactive Compounds/ Valuable Compounds	Potential Health Benefit/ Application
Kimchi	Cabbage powder and radish powder	Dietary fibers	Functional food
Soy sauce	Solid waste from soy sauce process	Protein, insoluble fiber	Food seasonings and additives
Fermented soybean food products	Insoluble residue (okara)	Phenolic compounds and proteins Oligosaccharides	Anti-obesity effects Prebiotic food
Tofu	Wastewater (tofu whey)	Peptide lunasin	Bloactive peptide
Fermented cabbage	Sauerkraut juice	Phenolic compounds, minerals, vitamins, sugars, and NaCl	Salt alternative and flavour enhancer



Valorization of waste from fermented food

Residual biomass from vegetable-based fermented foods represents a potential source of value-added bioactive compounds with health benefits and applications in nutraceuticals, functional foods, and dietary supplements. (table 2) (7).

For example, cabbage/radish powder and soybean dregs (okara) —byproducts from kimchi and fermented soybean factories, respectively— were used to successfully recover prebiotic dietary fibres (i.e. oligosaccharides) and proteins.

Okara is the residual byproduct generated when processing fermented soybean food products such as miso, natto, and tempeh. A recent report has studied the in vivo anti-obesity effects of phenolic compounds and proteins recovered from insoluble residuals derived from okara.

Sauerkraut juice from fermented cabbage was valorized by converting it into sauerkraut juice powder (SJP). SJP was found to be rich in minerals, especially calcium and potassium, as well as organic acids and vitamin C. SJP has umami attributes, such as sweet, sour, and salty. SJP was studied as a salt and MSG replacer due to its intense salty taste with strong Umami flavour (8).

Buttermilk, a byproduct obtained in the processing of cultured butter, was found to be rich in bioactive proteins and lipids, minerals, lecithin, and lactose. Its potential as a functional food, was explored due to an anti-hypertensive effect demonstrated in moderately hypercholesterolemic men and women.





Summary

Large quantities of waste is generated in fermentation-based processes such as grain alcohol, dairy and fermented food.

Innovative valorization strategies aim to recover high value ingredients from cereal, fruit and vegetable by-products, for use as natural sources of bioactive compounds for functional food formulation.

The conversion of dairy by-products into value-added products such as whey protein and lactose is an example of efficient by-product valorisation.

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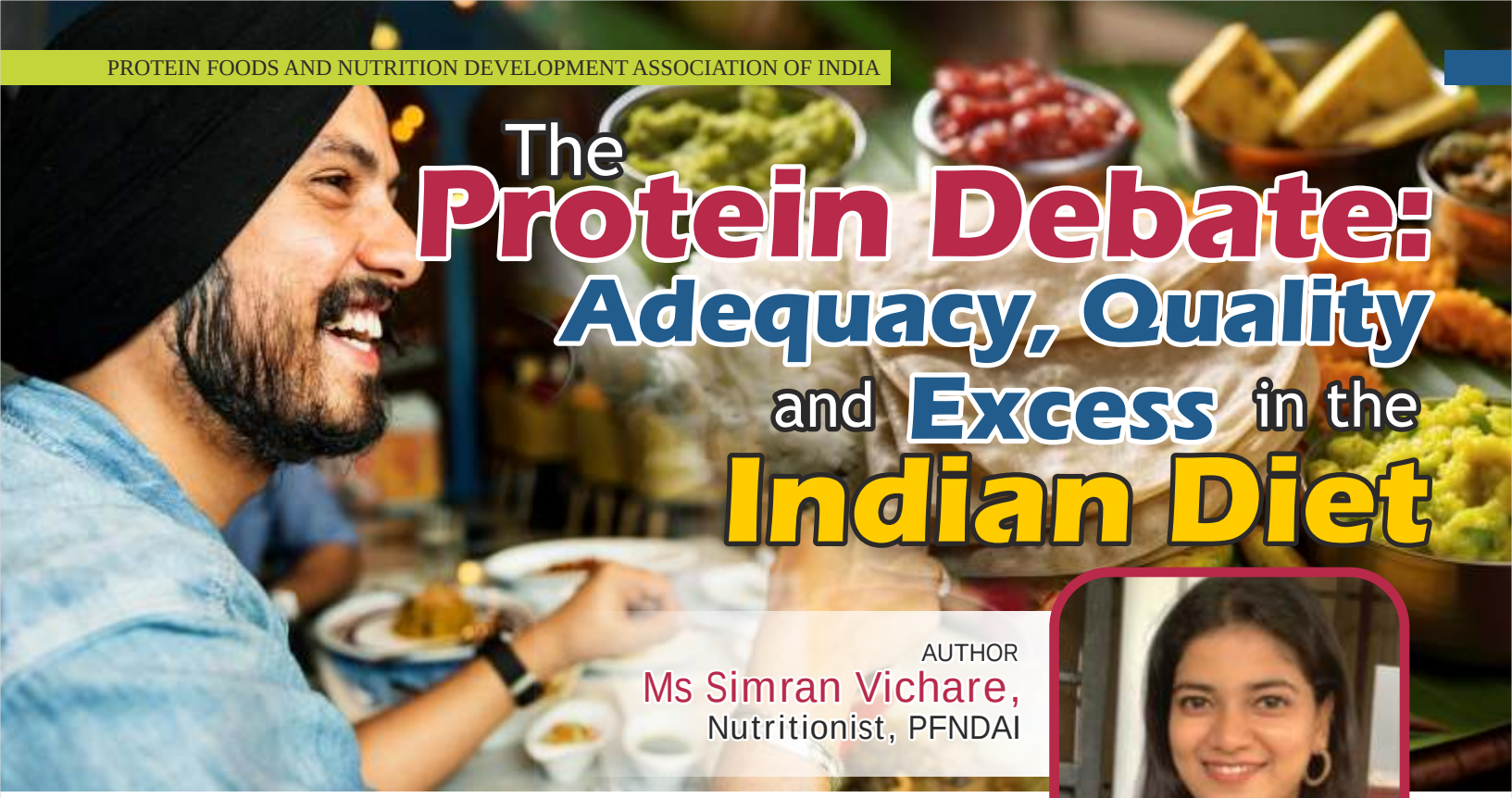
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The Protein Debate: Adequacy, Quality and Excess in the Indian Diet

AUTHOR
Ms Simran Vichare,
Nutritionist, PFNDAI

Protein has become one of the most discussed nutrients in today's health and fitness conversation. On one hand, concerns about protein deficiency; on the other, the rise of gym culture, high-protein diets, protein powders, and protein-enriched foods.

Protein intake varies with income, region, age, food access, dietary pattern, health status and physical activity.

India's protein debate involves several distinct questions: whether population groups meet their protein requirements, whether dietary sources provide sufficient essential amino acids, and whether higher intakes offer additional benefits for particular individuals. These questions require separate consideration rather than a single conclusion about whether Indians consume too little or too much protein.

What does the Indian diet tell us?

The Indian diet relies on a mix of plant-based and animal-based protein sources. A typical Indian vegetarian thali consisting of 2 Chapatis, 1 bowl of vegetable, 1 bowl of thick dal, ½ bowl of rice, a bowl of curd and salad will provide approximately 20-22 g of protein. Cereals tend to be relatively low in lysine, whereas pulses are relatively lower in methionine and cysteine. That is why the traditional combination of cereals and pulses is nutritionally relevant.

However, the presence of this combination in a diet does not, by itself, establish that protein intake is adequate; other factors should also be considered (8):

- Quantity: How much cereal, dal, dairy, soy or other protein-containing food is actually eaten?
- Quality: Does the overall diet provide adequate amounts of all essential amino acids?
- Availability: Can people afford and regularly access sufficient quantities of these foods?

Table 1: Type of food item and grams of protein present

Food item	Quantity	g of protein
Pulses	1 bowl cooked	14-18 g
Dal	1 bowl cooked thick dal	7-9 g
Sprouts	1 bowl cooked	3-9 g
Dairy products	100 g	6-8 g
Paneer	100 g	18-20 g
Cooked soya chunks	100 g	20-22 g
Egg	1 whole	7 g
Chicken	100 g	30 g
Lean fish	100 g	18-25 g

Table 1 gives an idea of the types of food items and the grams of protein present in them. Food affordability, access, appetite and meal patterns also influence what people actually consume.

Indian Studies

Indian studies report inadequate protein intake in particular populations, and national dietary analyses also show that average protein intake varies across settings and groups. Population-level data often reveal gaps in overall dietary diversity, where reliance on single cereal staples can lead to suboptimal protein intake or poor amino-acid profiles unless paired with complementary proteins.

Some studies have reported inadequate protein intake; for example, a large rural South Indian study found that about 45% of participants did not meet the study's WHO-based protein recommendation, with low consumption of pulses, dairy and flesh foods identified as contributing factors (1). At the same time, more recent evidence also indicates that protein intake remains relatively modest at the population level. Dietary data analysis of India on macronutrient intakes based on household 24-hour dietary recall showed that an average adult from urban India consumed 55 g of protein (2). These findings suggest that the Indian protein story cannot be reduced to a single statement such as "Indians eat too little protein."

Basically, population averages can hide substantial differences. Therefore, they should not be interpreted as proof that every Indian is protein-deficient or that protein deficiency is no longer a concern.

Protein Recommendations

The Indian Council of Medical Research (ICMR) and the National Institute of Nutrition (NIN) recommended a daily protein intake of 1 g/kg body weight earlier; later it was reduced to 0.83 g/kg for a healthy Indian adult. This reduction was based on FAO/WHO/UNU 2007 estimates of obligatory nitrogen losses and nitrogen-balance data and revised methodology, not evidence that Indians were consuming excess protein. The guidelines retain 1 g/kg/day for people consuming predominantly vegetarian diets (7).

Such reference values help assess adequacy at a population level; they are not automatically a personalised target for every life stage, health condition or training goal.



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- ☐ Workouts
- ☑ High Protein Pasta





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Per Pack



Protein requirements can vary with age, growth, pregnancy and lactation, body composition, physical activity, training status and health conditions. The protein requirements recommended for the general population and those suggested for exercising individuals differ in both purpose and evidence base. While ICMR–NIN recommends 0.83 g/kg body weight/day for healthy adults across sedentary, moderate and heavy occupational activity categories, the International Society of Sports Nutrition suggests 1.4–2.0 g/kg/day for many exercising individuals, particularly those undertaking regular training (9).

This raises an important question: should protein requirements be determined only by general population reference values, or should they also account for the intensity and type of physical activity, training goals and dietary protein quality? Although occupational work and structured exercise are not directly comparable, these differing recommendations highlight the need to study how protein requirements are assessed for different population groups.

Some studies suggest that muscle protein synthesis in young adults may be maximally stimulated by 20–25 g of high-quality protein per meal. However, protein consumed beyond this amount is not necessarily wasted. Amino acids can support other bodily functions and contribute to overall protein balance. These findings may also differ depending on the protein source, meal composition, and everyday dietary patterns (3).

There is no evidence that says 1.2 g/kg is too much for Indians, as it is just a viewpoint and not an established conclusion for the entire population. While 0.83 g/kg serves as the baseline requirement to prevent deficiency in sedentary adults, higher requirements ranging from 1.2 g/kg to higher, depending on goals, are frequently recommended for individuals with specific physiological conditions. Apart from protein intake, muscle development also depends on training stimulus, total energy intake, amino-acid availability, recovery and overall dietary adequacy.

Hence, the requirement totally depends on why the protein is being consumed, depending on an individual's body demands.

Protein quality:

Protein supplies amino acids, including nine essential amino acids that the body must obtain from food. Protein quality is influenced by the EAA pattern and how well the protein is digested and its amino acids made available to the body.





To help it be understood better, there are concepts such as PDCAAS (Protein Digestibility-Corrected Amino Acid Score) and DIAAS (Digestible Indispensable Amino Acid Score). These are scientific metrics used to measure dietary protein quality based on essential amino acid content and how well the body digests and absorbs them. For example, chicken has the highest PDCAAS and DIAAS of 1 and 1.08, whereas for nuts it is 0.40 and 0.39, respectively.

For individuals whose diets may not provide adequate protein, improving everyday food choices is a practical first step, as specialised protein supplements may not be feasible for every household. Soybeans and soy-based foods, pulses, milk and dairy products can help increase protein intake.

Eggs and other non-vegetarian foods may be another option for those who consume them. The most suitable choices will depend on local prices, availability, dietary preferences and the quantity required.

Food manufacturers have a potential role in improving access. Affordable, familiar and convenient foods can be formulated to provide additional protein without requiring consumers to adopt entirely new eating habits. Protein-enriched staples, ready-to-cook pulse products, and protein-enriched products can be added to curries, dals, or other preparations, and appropriately formulated foods may offer useful options for consumers.

Consumers should check relevant product nutrition information. Protein supplements and enriched foods are not essential for everyone, nor should they automatically be discouraged. Healthy individuals can generally begin by improving dietary variety and including affordable protein-rich foods, while those with diagnosed deficiencies or other relevant medical conditions should seek individualised advice from a qualified healthcare professional.

Health problems of excess protein consumption & how much is excess

For a normal healthy person, keeping total protein intake to not more than 2 g/kg of ideal body weight is generally advised, as intakes consistently above this can introduce physiological stress (4). The potential health risks associated with consuming too much protein include short- and long-term impacts.



Short-term symptoms include digestive issues like bloating, gas, cramps, or diarrhoea, which often result from low fibre intake or added sugar alcohols found in protein-rich products. Dehydration can also occur because high nitrogen and urea loads force the kidneys to flush out more water, leading to increased thirst and potential dehydration if fluid intake is not raised.

Low-carbohydrate, high-protein diets can push the body into ketosis, producing acetone waste that causes a fruity or metallic odour on the breath (5).



Surprisingly, there is no single number that defines 'too much protein'. For one individual, a protein intake may be inadequate. For another, the same intake may be sufficient.

Long-term symptoms include: Excess protein breakdown forces the kidneys to work harder to filter out nitrogen waste products.

They cause intraglomerular hypertension (increased pressure in the kidney filters), elevated uric acid, and a higher risk of kidney stones or accelerated decline in people with pre-existing kidney disease (6).

High-protein and high-acid diets can also trigger hypercalciuria (excess calcium in the urine) and a negative calcium balance over time, potentially impacting bone density (4).

For someone engaged in intensive training, a higher intake may have a different context. For someone with kidney disease or another health condition, the appropriate intake may vary.

Conclusion

Both situations of protein deficiency and excess co-exist in India, so instead of just focusing on the grams of protein intake, adequacy must be considered. India's protein challenge is not simply about too little or too much intake.

Adequacy depends on quantity, protein quality, digestibility, amino-acid balance, dietary diversity, and individual needs across age, life stage, and activity level.

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Report on Nutrition Awareness Activity on "Connecting Foods, Nutrition, and Technology for a Healthier Future" – ICT Mumbai on 24th September 2026

By
Ms Anuja Padte,
Food Scientist, PFNDAI

Protein Foods and Nutrition Development Association of India (PFNDAI), in collaboration with Marico India Ltd. and the Department of Food Engineering and Technology, Institute of Chemical Technology (ICT), Mumbai, organised a Nutrition Awareness Activity on *"Connecting Foods, Nutrition, and Technology for a Healthier Future"* on 24 September 2026 at ICT, Mumbai.

The activity was designed for undergraduate and postgraduate students and brought together students from Foods and Nutrition-related programmes across Mumbai. More than 90 students attended the programme and expert presentations.

The programme comprised three key components: a recipe competition, expert talks and presentations, and a quiz competition. The recipe competition provided students with an opportunity to apply their academic knowledge of food, nutrition, and technology through practical food preparation using Marico's products. A total of 35 students participated by developing innovative recipes, from which the top three entries were selected.

The recipe entries were evaluated by a panel of judges comprising Dr. Suneeta Chandorkar, Dr. Sirimavo Nair, Ms. Anuja Padte, Ms. Anjana Menda, Ms. Priya Lohar, and Ms. Shruti. Participants were provided with competition guidelines, and their entries were assessed against defined criteria, including recipe evaluation, preparation of a nutrition information table, ingredient listing, label design with claims, recipe presentation, and sensory evaluation.

The competition encouraged students to demonstrate their creativity and apply their knowledge of nutrition, product development, food labelling, and sensory attributes in developing nutritious food products. It also provided a practical platform for connecting classroom learning with real-world food product development.



The formal programme commenced with the inaugural address by Dr. J. S. Pai, Chairman, Seminar & Conference Committee, PFNDAI. Drawing on his experience as a former Head of Department at ICT, he shared his experiences with the students and provided an overview of PFNDAI and its activities.





This was followed by the welcome address by Dr. Uday Annapure, Head of the Department of Food Engineering and Technology, ICT. He expressed his sincere gratitude to PFNDAI for selecting ICT as the collaborator for the activity and acknowledged the support extended by the sponsors in making the programme possible.



Dr. Malathy Venkatesan, Project Coordinator, PFNDAI delivered the theme address on "Connecting Foods, Nutrition, and Technology for a Healthier Future," highlighting the importance of dietary fibre in promoting gut health and overall well-being. The address underscored the importance of informed food choices in supporting digestive health and long-term well-being.



Ms. Simran Vichare, Nutritionist, PFNDAI, welcomed the speakers before the technical sessions.

The first scientific presentation, "Breakfast Science: Timing, Composition, and Metabolic Health", was delivered by Prof. Suneeta Chandorkar, Retired Professor of Foods and Nutrition. She explained that breakfast is the first meal after the overnight fast and plays an important role in daily nutrition, metabolism, appetite and blood-glucose control. A balanced breakfast containing protein, whole grains, fibre, healthy fats and micronutrients can improve satiety and influence the body's response to the next meal. She also discussed the "second-meal effect" and the five Ts of breakfast: Timing, Type, Total Energy, Texture and Processing, and Target Individual. Her key message was that breakfast choices should be suited to the individual and the overall dietary pattern.





The next presentation, "Oats – A Supergrain: Harnessing Nutrient Synergy for Metabolic Health", was delivered by Dr. Kejal Joshi, Nutrition Manager, Marico India Ltd. The talk highlighted the nutritional value of oats in the context of India's growing burden of non-communicable diseases and the dual challenge of undernutrition and overnutrition. It emphasised balanced diets, whole grains, quality proteins, healthy fats, physical activity, weight management and regular health check-ups. Oats were discussed as a source of dietary fibre, beta-glucan, protein, unsaturated fats, micronutrients and polyphenols. The presentation reviewed evidence related to the potential role of oats in supporting gut health, glucose control, weight management, blood pressure and cholesterol as part of a balanced diet and healthy lifestyle.



The session "Smart Choices for Glycaemic Health: From Metabolic Links to Evidence-Based Dietary and Lifestyle Strategies" was presented by Prof. Subhadra Mandalika, Nutritionist and Former Faculty, College of Home Science, Nirmala Niketan, Mumbai. She discussed evidence-based dietary and lifestyle approaches for glycaemic health and diabetes management, including the roles of insulin resistance, inflammation, oxidative stress, altered gut microbiota and other metabolic disturbances. She highlighted the importance of carbohydrate quality and quantity, dietary fibre, micronutrients, quality proteins, healthy fats, diverse plant foods and suitable physical activity. The presentation encouraged combining

traditional dietary wisdom with scientific evidence to support personalised and sustainable nutrition strategies.



The final technical presentation, "Strengthening Nutrition through Food Fortification", was delivered by Dr. Sirimavo Nair, Head and Honorary Professor at the Centre for Public Health, Navrachana University, Vadodara. She explained food fortification as a cost-effective and scalable strategy to help address undernutrition and micronutrient deficiencies, including anaemia and deficiencies of vitamins A and D and iodine. Examples included double-fortified salt, edible oil, milk and wheat flour. She also discussed the regulatory role of the Food Safety and Standards Authority of India (FSSAI) under the Food Safety and Standards Regulations, 2018, and referred to government programmes supporting the distribution of fortified foods.

Following the technical sessions and lunch, students participated in the quiz competition, which covered public health, nutrition, food technology and food preservation. A total of 18 groups, comprising 54 students, took part. The quiz provided an interactive opportunity for students to test and reinforce their knowledge across the programme's subject areas. Overall, the Nutrition Awareness Activity offered students an opportunity to learn from experts and connect scientific knowledge with everyday food choices. The presentations covered breakfast composition and metabolic health, the nutritional benefits of oats, evidence-based approaches to glycaemic health, and the role of food fortification in addressing micronutrient deficiencies. Participation by more than 90 students, along with the recipe and quiz competitions, helped strengthen the connection between academic learning and practical application in food and nutrition.
Following the student interaction, the winners of the competitions were announced as follows:

Recipe Competition Winners

- First Prize: Ms Fatima Sayyed – Protein Tart Mousse
- Second Prize: Ms Arya Dhotre – Pink Protein Button Pasta
- Third Prize: Ms Eram Seraj Khan – Nutritious Patty

Quiz Competition Winners

- Ms Nandini Naik
- Mr Lakshmivardhan A. N.
- Mr Yeliyas Gandikota

The winning students were felicitated with certificates, gift vouchers, and trophies in recognition of their achievements.

The programme concluded with a vote of thanks delivered by Ms Simran Vichare, who expressed her gratitude to the dignitaries, speakers, participating colleges, students, and collaborating organisations for their valuable contributions to the successful organisation of the activity.



Speakers & Organisers


Recipe Contest 1st prize - Ms Fatima Sayyed


Recipe Contest 2nd prize - Ms Arya Dhotre


Recipe Contest 3rd prize - Ms Eram Seraj Khan


1st prize receipe


2nd prize receipe


Recipe Contest Winners


Quiz contest winner - Mr Lakshmivardhan



3rd prize receipe


Quiz contest winner - Mr Yeliyas


Quiz contest winner - Ms Nandini Naik


Audience


Audience



REGULATORY ROUND UP

AUTHOR
Ms. Sanyukta Telange,
Food Technologist and Regulatory Support,
PFNDAI

Gazette Notification of the Food Safety and Standards (Laboratory and Sample Analysis) Amendment Regulations, 2026 relating to Timeline for Analysis of samples, Method of Analysis and testing report formats in alignment with FSS Act/Rules/Regulations: 14-09-2026

https://fssai.gov.in/docs/food-law/notice-comment/Notification%20dated%2014.09.2026_amendment.pdf

FSSAI has notified amendments to the Food Safety and Standards (Laboratory and Sample Analysis) Regulations, 2011, effective from 1 April 2027. The amendments prescribe a timeline of 14 days for issuing signed analysis reports for samples, with the concerned authorities to be informed of the reasons and additional time required in case of delays. For imported food samples, laboratories are required to issue the laboratory analysis report within five days of receiving the sample or provide written reasons for any delay to the Authorised Officer. The amendments also specify the use of FSSAI-prescribed methods of analysis, while permitting validated methods from recognised national and international bodies if a method is unavailable in the Authority's manuals. Further, Forms A and B shall be omitted from the existing regulations.

Order regarding Compliance with timely analysis and reporting of food articles referred to the FSSAI-notified Referral Laboratories: 18-09-2026

https://fssai.gov.in/docs/food-law/advisory/Order%20dated%2018.09.2026%20to%20referral%20laboratory.pdf

FSSAI has issued an order emphasising the timely analysis of food samples referred to FSSAI-notified Referral Laboratories and the submission of analysis reports within the prescribed timelines (i.e., within 14 working days of receipt of the samples). This initiative aims to facilitate the timely evaluation and implementation of food recall procedures through the Food Recall functionality in the FoSCoS system. States/UTs have also been requested to ensure systematic and timely recall evaluation based on referral laboratory test results and report any delays in analysis or reporting to FSSAI for necessary follow-up action.



Draft Food Safety and Standards (Prohibition and Restrictions on Sales) Amendment Regulations, 2026 relating to restriction of paneer made of constituents not derived from milk: 22-09-2026

https://fssai.gov.in/docs/food-law/notice-comment/Notification%20dated%2023.09.2026.pdf

FSSAI has proposed amendments to the Food Safety and Standards (Prohibition and Restrictions on Sales) Regulations, 2011, to restrict the manufacture and sale of analogue products under the name "Paneer" and prevent consumers from being misled regarding the nature and composition of the product. Products already licensed or registered under the "Analogue in Dairy Context" category will be required to discontinue the use of the term "Paneer" in their nomenclature, labelling and marketing. The draft regulations have been published for public comments, with objections and suggestions to be considered by FSSAI within 60 days from the date Official Gazette copies are made available to the public.

Special festive drive to ensure food safety, quality and prevention of adulteration: 29-09-2026



https://fssai.gov.in/docs/food-law/advisory/Letter%20dated%2029.09.2026%20w.r.t%20Special%20festive%20drive.pdf

FSSAI has directed officials to intensify inspections and sampling during the upcoming Navratri and Diwali festive season to prevent the circulation of adulterated, counterfeit and unsafe food products. The drive will focus on high-demand food categories, including milk and milk products, sweets, snacks and savouries, edible oils, beverages and ghee, along with region-specific food commodities. Designated Officers, Food Safety Officers and Central Food Safety Officers have been instructed to conduct enforcement activities at identified hotspots and sensitive locations. Food Safety on Wheels (FSW) vehicles, wherever available, are to be deployed strategically for on-the-spot testing, surveillance and consumer awareness. All inspection, sampling and outcome data must be updated in FoSCoS/FoSCoRIS on a real-time basis.

Updated Status of Approved RAFT Applications as on 1st October 2026: 01-10-2026

https://fssai.gov.in/docs/food-law/advisory/Updated%20Status%20of%20approved%20RAFT%20Applications%20as%20on%2001.10.2026.pdf

FSSAI has issued an updated status of approved Rapid Analytical Food Testing (RAFT) applications. RAFT-approved kits and equipment are intended for screening and surveillance support, not to replace conventional laboratory analysis.





Validity Order of FSSAI-notified food testing laboratories as on 9th October 2026: 09-10-2026

https://fssai.gov.in/docs/food-law/advisory/ValidityorderSeptemberfinal.pdf

FSSAI has issued an updated list of food testing laboratories, along with the validity of their NABL accreditation and contact details, for the analysis of food samples collected under the Food Safety and Standards Act, 2006, and the rules and regulations made thereunder.

Gazette Notification of the Food Safety and Standards (Vegan Foods) Amendment Regulations, 2026 relating to the certificate to be issued by the recognized authorities of the exporting countries for Vegan food products: 28-09-2026

https://fssai.gov.in/docs/food-law/notice-comment/Notification%20dt%2028.09.2026.pdf

FSSAI has amended the Food Safety and Standards (Vegan Foods) Regulations, 2022, to prescribe Form I for the certificate to be issued by a recognised authority in the exporting country for products seeking endorsement of the Vegan logo. The prescribed format requires details of the exporter, importer, product composition, manufacturing and packaging information, and intended use etc., along with declarations relating to the absence of animal testing, prevention of unintended contamination with non-vegan substances, segregation or appropriate cleaning of production facilities, and traceability of ingredients. The regulation will come into force on 1 April 2027.





RESEARCH IN HEALTH & NUTRITION

Gut Bacteria Convert Nitrate and Iron into Heart-Protective Molecules

Swedish researchers at Karolinska Institutet have discovered that gut bacteria can convert dietary nitrate and non-heme iron into protective molecules known as dinitrosyl iron complexes (DNICs).

These molecules were shown in animal studies to lower blood pressure, improve blood sugar regulation, and reduce fat accumulation in the liver, with the strongest benefits occurring when nitrate and iron were consumed together. The findings suggest that dietary iron may help explain why previous studies on nitrate supplementation have produced mixed results, as iron is required for DNIC formation while nitrate alone is insufficient.

The study demonstrated that DNICs are absorbed by key organs such as the liver and kidneys, and their presence depends on gut microbiota. Germ-free mice lacked DNICs, confirming the essential role of bacteria. Using electron paramagnetic resonance (EPR), the researchers directly detected DNICs in tissues, showing that they are naturally present in healthy animals but increase sharply when nitrate and iron are combined in the diet. Human fecal samples and experiments with E. coli confirmed that nitrate reductase-expressing bacteria are central to this process, and tests with human liver cells indicated that DNICs can exert protective effects in human tissues as well.

Nitrate is abundant in vegetables like beetroot and leafy greens, while non-heme iron is found in plant-based foods such as beans, whole grains, and nuts. The researchers emphasize that nitrate and iron act in a complementary way, with nitrate serving as the substrate reduced by bacteria and iron providing the necessary component for DNIC formation. Alone, neither compound produced the same protective effects. This synergy may explain why dietary nitrate studies have yielded variable outcomes, depending on iron availability in the diet.

The work highlights that iron deficiency could impair DNIC formation, reducing the potential cardiometabolic benefits of nitrate supplementation. In mice, nitrate supplementation was ineffective under near-zero-iron diets, but combining nitrate with iron restored benefits. While these findings are promising, the researchers caution that human trials are needed before recommending nitrate or iron supplementation specifically to boost DNIC production. They suggest that future directions could include identifying key bacterial species involved in DNIC generation or developing probiotics to enhance this pathway.

Overall, the study introduces a new microbiota-dependent mechanism linking diet, gut bacteria, and cardiometabolic health, showing how two potentially harmful compounds—nitrate and iron—can be transformed by gut microbes into protective molecules that may reduce disease risk.

https://www.nutritioninsight.com/news/gut-bacteria-nitrate-iron-dnic-heart-health.html



Tomato Compound May Protect Against Fatty Liver Disease

Researchers at Tufts University have identified phytoene, a colourless carotenoid precursor found in tomatoes, as a promising compound for protecting against fatty liver disease.

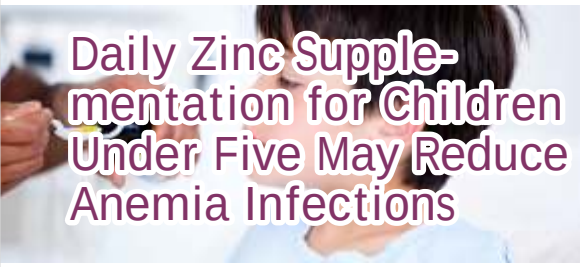
In a mouse study, animals fed a high-refined-carbohydrate diet and supplemented with phytoene showed significantly fewer markers of fatty liver disease compared to those without supplementation. The compound appears to work by activating proteins that regulate liver metabolism rather than altering gut bacteria, suggesting a direct metabolic effect.

Fatty liver disease, which affects around 100 million adults in the US and is highly prevalent among individuals with obesity or diabetes, involves excess fat accumulation in liver cells that can progress to inflammation, damage, and cirrhosis. While lycopene has long been studied for its liver-protective properties, tomato powder has consistently outperformed purified lycopene in animal studies, leading researchers to suspect that other tomato-derived compounds contribute to the benefits. Phytoene, which is more readily absorbed than lycopene, emerged as a key candidate.

In the study, mice received phytoene supplementation equivalent to consuming three to four medium-sized raw tomatoes or 100 grams of tomato paste daily. Those supplemented showed improved liver health outcomes, while mice lacking enzymes to metabolize phytoene accumulated the compound but did not gain protection, suggesting that its breakdown products may be responsible for the benefits. The researchers also observed sex-based differences, with female mice accumulating more phytoene in the liver than males, indicating that biological factors may influence absorption and metabolism.

Phytoene is not limited to tomatoes; it is also present in carrots, red peppers, pink grapefruit, watermelon, and apricots, broadening its dietary relevance. The findings suggest that encouraging consumption of phytoene-rich foods could become a strategy to help prevent or slow the progression of metabolic liver disease, though further research is needed to identify the specific metabolites involved and to confirm benefits in humans. The study highlights phytoene's potential as a dietary compound with significant implications for public health, particularly in populations at high risk of liver disease.

https://www.nutritioninsight.com/news/phytoene-tomatoes-fatty-liver-disease.html



Daily Zinc Supplementation for Children Under Five May Reduce Anemia Infections

A randomized clinical trial in Uganda has shown that daily zinc supplementation can reduce infections in young children with sickle cell anemia.

The study involved 100 children under five years old who received either 20 mg of zinc sulphate or a placebo for six months. Those given zinc experienced fewer overall infections compared to the placebo group, while no adverse events requiring discontinuation were reported.

The supplementation did not reduce malaria cases, but it was effective against respiratory infections and diarrhea, two of the most common illnesses in this population.

The researchers highlight that children with sickle cell anemia are prone to zinc deficiency because the condition causes increased zinc release during bone pain crises and red cell breakdown, with much of it lost through urine.

This deficiency may contribute to their higher susceptibility to infections. Zinc supplementation, therefore, helps restore immune function and reduce infection risk.

Importantly, the benefits were observed even though all participants were already receiving hydroxyurea, penicillin prophylaxis, and pneumococcal immunization, showing zinc's potential as an additional protective measure.

The 20 mg daily dose was well tolerated, and the researchers suggest it may be the most suitable dose for children under five, as higher doses like 30 mg have been less well tolerated in other studies. However, the optimal duration of supplementation remains uncertain, and longer trials may reveal greater benefits.

The study was conducted at a single site and did not assess reductions in severe infections requiring hospitalization, so larger multi-site trials are needed to confirm the findings and explore effectiveness in older children.

Overall, the results suggest zinc supplementation could be a safe, inexpensive, and effective way to reduce infections in children with sickle cell anemia, though further research is required to establish long-term protocols and broader applicability.

https://www.nutritioninsight.com/news/zinc-supplementation-sickle-cell-anemia-children.html



Isovalerate Might Be Key to Improving Malnutrition in Children

A study from Baylor College of Medicine and Texas Children's Hospital has identified isovalerate, a microbial metabolite, as a potential low-cost intervention to strengthen the gut barrier in malnourished children.

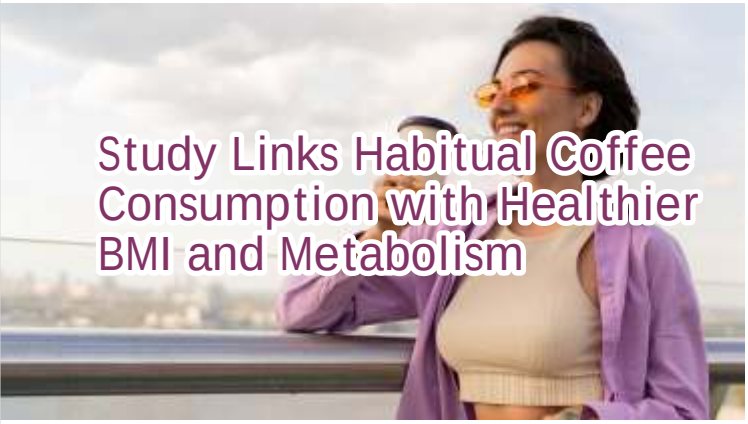
Using a mouse model, researchers found that malnutrition damaged the intestinal barrier only in mice with gut bacteria and only in males, reflecting the higher risk of sepsis observed in malnourished boys. The damage included thinning of the protective mucus layer and increased permeability, allowing bacteria to invade organs such as the liver and spleen.

The team discovered that branched-chain fatty acids, including isovalerate, were depleted in malnourished mice but abundant in healthy ones. Isovalerate was shown to reinforce gut barrier integrity by rearranging proteins that form tight junctions, as confirmed in human colon organoids.

Supplementing mice with isovalerate directly or feeding them leucine, which gut bacteria convert into isovalerate, improved gut barrier function. This suggests that leucine supplementation could serve as a practical prebiotic strategy, as it is inexpensive, shelf-stable, and well tolerated.

The findings highlight sex-specific differences in malnutrition's impact on the gut, with male mice more vulnerable to barrier damage. They also point to isovalerate as a previously overlooked metabolite with protective effects. While the results are promising, the researchers emphasize that human studies are needed to confirm whether leucine supplementation can safely and effectively reduce sepsis risk and improve outcomes in malnourished children.

https://www.nutritioninsight.com/news/isovalerate-gut-barrier-child-malnutrition.html



Study Links Habitual Coffee Consumption with Healthier BMI and Metabolism

A study from Baylor College of Medicine and Texas Children's Hospital has identified isovalerate, a microbial metabolite, as a potential low-cost intervention to strengthen the gut barrier in malnourished children.

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https://www.nutritioninsight.com/news/coffee-health-benefits-bmi-metabolism-insulin.html



Pomegranates May Boost Heart Failure Recovery by Stimulating Urolithin A Production

Researchers have identified urolithin A, a compound produced in the body after consuming foods such as pomegranates, walnuts, and certain berries, as a potential therapeutic agent for heart failure with preserved ejection fraction (HFpEF).

This condition, which accounts for about half of all heart failure cases, is particularly difficult to treat because the heart continues to pump blood but becomes stiff and unable to fill properly. Current management strategies focus on addressing underlying conditions like obesity, diabetes, and hypertension, but effective treatments remain limited.

In animal models, urolithin A improved heart function by up to 80%, enhancing muscle relaxation, reducing fibrosis, and preventing harmful enlargement of heart cells. The compound works by activating the protein PKGIα, which plays a key role in cardiovascular function. Tests in engineered human heart tissue derived from stem cells also showed improved relaxation, suggesting translational potential for human therapy.

These findings, described as a "research first" by the study team, highlight a new therapeutic pathway and a naturally derived compound with a favourable safety profile already established in human studies.

Despite the promising results, the researchers caution that clinical trials in humans are still needed to confirm efficacy. They emphasize that while dietary intake of pomegranates and similar foods may support overall heart health, no single food can treat heart disease.

Instead, the discovery points to the possibility of developing new drugs or dietary strategies that harness urolithin A's effects to improve outcomes for patients with HFpEF, a condition that often leads to breathlessness, fatigue, and reduced quality of life.

https://www.nutritioninsight.com/news/pomegranate-heart-failure-cardiovascular-health.html



Biofortified Pearl Millet Improves Toddler Iron Levels and Gut Health Without Side Effects

A recent pediatric nutrition study has shown that feeding toddlers biofortified pearl millet for nine months significantly improved their iron levels without the digestive side effects often linked to iron supplements.

The research, conducted in Mumbai with 223 children aged 12 to 18 months, found that the food-bound iron in millet enhanced beneficial gut microbiome pathways, supporting natural antibiotic-like activity, antioxidant metabolism, and pollutant degradation. At the same time, markers associated with harmful bacteria were reduced, suggesting a healthier gut environment overall.

The pearl millet used in the trial was developed through traditional cross-breeding and contained nearly three times the iron of standard varieties, along with higher zinc content. Unlike supplements, which can disrupt the gut's bacterial ecosystem and cause symptoms such as diarrhea or constipation, biofortified crops deliver nutrients in a more physiologically aligned form.

This food-based approach integrates seamlessly into diets, offering a sustainable alternative to supplementation programs that rely on distribution infrastructure and consistent adherence.

Dr. Saurabh Mehta, principal investigator and founding director at Cornell University's Joan Klein Jacobs Center for Precision Nutrition and Health, explained that the children consuming biofortified millet showed increased microbial activity linked to pathogen defence and antioxidant metabolism.

He emphasized that iron deficiency affects roughly one in four people globally, particularly young children, where it can impair brain development and increase vulnerability to infection. By embedding micronutrients directly into staple foods, biofortification may help move away from one-size-fits-all supplementation strategies and toward more personalized, sustainable nutrition solutions.

The study, published in Nature Communications, is among the first to examine how biofortified crops influence the human gut microbiome.

Researchers collaborated with SNDT Women's University to develop millet-based recipes and partnered with the Centre for the Study of Social Change to deliver them to families. While the trial focused on iron and zinc, Mehta noted that other nutrients, such as vitamin A, have also been delivered through biofortified crops, though their impact on the microbiome remains less studied.

He stressed that biofortified foods should be seen as complementary to existing interventions, with larger and longer-term studies needed to fully understand their potential in addressing global micronutrient deficiencies.

https://www.nutritioninsight.com/news/biofortified-pearl-millet-iron-gut-health-toddlers.html

Postbiotic Reduces Inflammatory Immune Markers Within Hours

A newly published clinical trial has demonstrated that a single 500 mg dose of Cargill's yeast-derived postbiotic, EpiCor, can significantly reduce pro-inflammatory immune markers in healthy adults within one to three hours.

Conducted as a randomized, double-blind, placebo-controlled crossover study with thirty participants, the trial measured immune responses using flow cytometry and cytokine analysis. Results showed rapid modulation of immune biomarkers, including reductions in pro-inflammatory cytokines and a transient redistribution of CD25+ immune cell subsets. By the first hour, systemic inflammatory markers were notably lower compared to placebo, and by the second hour, cytokines such as IL-4, IL-7, and IL-8 were significantly decreased. These findings suggest that EpiCor provides targeted immune modulation rather than broadly suppressing immune activity.

The study builds on earlier pediatric research, which found that daily supplementation with EpiCor reduced the severity of cold and flu symptoms in children aged four to twelve. Children receiving EpiCor were nearly twice as likely to avoid prescription or over-the-counter medications compared to those on placebo, and caregivers reported lower severity of sore throats and muscle aches. This pediatric trial was also notable for using a gummy format, which is challenging for functional ingredients due to manufacturing conditions.

EpiCor is produced through the fermentation of Saccharomyces cerevisiae (baker's yeast), yielding a mix of metabolites and bioactive compounds. Cargill is working with food and beverage brands to expand postbiotic applications into formats such as functional drinks, teas, juices, wellness shots, gummies, and child-friendly products like bars and applesauce packs. At industry events, the company has showcased prototypes such as immune-supportive iced tea featuring EpiCor.

Consumer awareness of postbiotics remains limited, with only about one-third of global consumers recognizing the term on labels, often due to its similarity to prebiotics and probiotics. Despite this, product launches are growing, led by the US, South Korea, and Australia, with supplements in capsule and powder formats dominating. The science behind postbiotics is diversifying, with applications extending beyond immunity to areas such as muscle building, as seen in recent innovations like Superbrewed Food's cultured protein and Samyang Roundsquare's Spindle Muscle+ supplement. Together, these developments highlight the expanding role of postbiotics in functional nutrition and their potential to deliver rapid, measurable health benefits.

https://www.nutritioninsight.com/news/cargill-epicor-yeast-postbiotic-immune-study.html





Active Nutrition Shift from Sports to Everyday Functionality

Austria Juice is highlighting how active nutrition is evolving beyond sports performance into everyday functionality, with consumers increasingly seeking convenient, multifunctional products that support energy, hydration, focus, recovery, and preventive health.

Marketing manager Julia Wurzer explains that beverages are no longer seen as simple thirst-quenchers but as functional solutions for daily well-being. This shift is driving demand for products that combine protein with emerging ingredients such as fibre, probiotics, amino acids, and functional mushrooms like lion's mane, appearing in formats ranging from coffee and tea to protein drinks. Ready-to-drink beverages, smoothies, and snackable formats are gaining traction as convenience becomes a priority.

Protein remains central to active nutrition, but formulating protein-based drinks continues to pose sensory challenges, with bitter or chalky notes affecting consumer acceptance.

Austria Juice addresses this through tailored flavour compositions and technologies such as Flavors with Modifying Properties, which allow precise control of sweetness and taste without altering ingredient lists, supporting clean-label and "better-for-you" trends. The company emphasizes that flavour innovation is essential to ensure consumer-friendly products that deliver both efficacy and enjoyment.

Head of Procurement Ingredients Dominik Wieser notes that supply chain volatility is another challenge, particularly in the current macroeconomic environment. Austria Juice mitigates risks by diversifying sourcing channels and maintaining long-term supplier partnerships across regions, ensuring ingredient availability, consistent quality, and efficacy even during crises.

The company also recognizes the growing role of AI and wearable devices in personalizing nutrition, with AI-assisted formulation tools helping identify microbial strains and accelerate innovation tailored to consumer needs.

Overall, Austria Juice sees active nutrition shifting toward longevity and everyday functionality, with consumers of all ages seeking products that support a more active life. By combining flavour science, diversified sourcing, and a focus on multifunctional ingredients, the company aims to meet evolving consumer expectations while navigating formulation and supply chain hurdles.

https://www.nutritioninsight.com/news/austria-juice-active-nutrition-formulation-hurdles.html



Industry Personalizes Healthy Aging Nutrition to Boost Adherence and Enjoyment

The healthy aging nutrition sector is increasingly focused on personalization, convenience, and enjoyment to ensure adherence and long-term impact.

Industry leaders are moving away from vague "anti-aging" claims toward measurable health span outcomes, emphasizing evidence-backed formulations and delivery formats that fit seamlessly into daily routines.

Valio stresses that personalization must be practical, with solutions designed to integrate naturally into everyday diets. Sensory quality is key, as appetite often declines with age, so products must be palatable and enjoyable. Their portfolio includes lactose-free options for digestibility, probiotic-enriched products for gut health, high-protein solutions for muscle support, and phospholipid-rich ingredients for cognitive function.

Akay Bioactives focuses on clinically validated botanicals targeting pathways such as cognition, hormonal balance, metabolic health, sleep, and musculoskeletal wellness.

Their patented FenuMat technology enhances bioavailability, lowers effective dosages, and improves sensory properties, making it easier to incorporate ingredients into formats like gummies, beverages, and powders.

Balchem highlights the importance of nutrient stability and bioavailability, especially in multi-ingredient formulations. Their K2Vital Delta, a double-microencapsulated vitamin K2, ensures compatibility with minerals, while their Vital Trio concept combines K2 with magnesium bisglycinate and vitamin D3 for immunity and heart health. They also developed VitaCholine Pro-Flo to stabilize choline for multivitamins, addressing its hygroscopic nature.

Sirio Europe emphasizes that efficacy alone is insufficient; supplements must be enjoyable and convenient. Their LifeChews, a plant-based gel tablet system, deliver lipid-based nutrients in a pleasant chewable format, encouraging daily use. Their Aeion platform offers multiple formats to suit different age groups, ensuring adherence across demographics.

Gnosis by Lesaffre focuses on tailoring formulations to age, genetics, and dietary patterns. They note that SAMe and folate supplementation benefits vary depending on age-related absorption declines and genetic polymorphisms like MTHFR.

Personalized solutions may combine SAMe with bioavailable folate for populations with low B vitamin intake, such as vegetarians. They stress that personalization requires attention to delivery formats, stability, and dosing schedules.

Overall, the industry is converging on a model where personalization, bioavailability, stability, and enjoyable formats drive adherence, ensuring that healthy aging solutions deliver measurable benefits across diverse populations and life stages.

https://www.nutritioninsight.com/news/personalized-nutrition-healthy-aging-delivery.html



Industry Experts Reveal How to Balance Sugar Reduction Demands with Health and Taste

The article you're viewing delves into the complex balancing act food and beverage companies face as they respond to growing consumer demand for reduced sugar products.

While health-conscious shoppers are increasingly attentive to sugar content, taste remains the ultimate deciding factor in purchase decisions. This tension forces brands to innovate in ways that preserve the sensory qualities people love—sweetness, texture, and mouthfeel—while cutting back on added sugars.

Industry experts explain that sugar is not just a sweetener; it plays multiple functional roles in food, from bulking and binding to enhancing flavour release and providing a satisfying texture. Removing or reducing it can therefore disrupt the entire product experience.

To address this, companies are turning to natural sweeteners like stevia, monk fruit, and allulose, which can deliver sweetness with fewer calories. However, these alternatives often come with challenges such as bitterness, aftertaste, or different solubility properties, requiring careful blending with flavour modulators or masking agents.

Another strategy involves incorporating fibres and prebiotics, which not only help replicate sugar's bulk but also add digestive health benefits. Flavour enhancers and aroma compounds are also being used to amplify sweetness perception without increasing sugar content. The article notes that this multi-pronged approach is essential to ensure consumers don't feel they are sacrificing enjoyment for health.

Clean-label expectations further complicate reformulation. Today's consumers want ingredient lists that are short, simple, and recognizable, avoiding artificial additives or chemical-sounding names. This means brands must source natural, minimally processed ingredients that align with transparency and sustainability values. The challenge is to achieve sugar reduction without resorting to synthetic solutions that could undermine consumer trust.

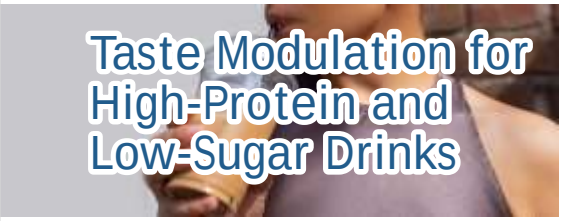
Experts stress that successful sugar reduction is not just about swapping ingredients but about rethinking product design from the ground up. This includes reformulating recipes, adjusting processing methods, and even reimagining product categories to deliver indulgence with less sugar. Innovation in ingredient technology, such as fermentation-derived sweeteners or plant-based extracts, is opening new possibilities.

Ultimately, the article underscores that sugar reduction is a holistic endeavour requiring collaboration between food scientists, nutritionists, and marketers.

It is about striking a delicate balance: meeting public health goals by lowering sugar intake while ensuring products remain appealing, enjoyable, and aligned with modern clean-label standards.

The future of sugar reduction lies in creative solutions that satisfy both the palate and the conscience, proving that healthier choices don't have to come at the expense of taste.

https://www.nutritioninsight.com/news/sugar-reduction-taste-texture-clean-label.html



Taste Modulation for High-Protein and Low-Sugar Drinks

Synergy Flavors is spotlighting its Smart Sugar Control taste modulation technologies as a solution for the growing demand for reduced-sugar and high-protein beverages.

With global regulations tightening and sugar taxes expanding — such as the UK's Soft Drinks Levy lowering its threshold to 4.5 g per 100 mL by 2028 and extending to milk-based drinks — manufacturers are under pressure to reformulate. Synergy's modulators are designed to enhance sweetness perception, balance flavour profiles, and mask off-notes like chalkiness in protein drinks or bitterness from synthetic sweeteners, creating a cleaner taste experience.

The company's sensory testing shows that applying sweetness modulators to reduced-sugar beverages not only improves perceived sweetness but also enhances fruity and juicy notes while reducing acidity, leading to better overall flavour and consumer preference. Beyond sugar reduction, taste modulation is being adapted to support protein fortification, particularly relevant for consumers using GLP-1 medications who often experience altered taste perception and muscle loss. Synergy's research indicates that nearly half of GLP-1 users report changes in how they perceive sweetness, with many preferring less-sweet flavours, opening opportunities for innovation in functional beverages.

Functional beverage trends are shifting toward protein enrichment, women's health, GLP-1 support, and natural energy sources. Protein has moved into the mainstream, with 82% of consumers expressing interest in protein-containing products, and women's health is projected to be one of the fastest-growing categories. Meanwhile, natural, crash-free energy ingredients like matcha are gaining traction as consumers seek sustained focus without caffeine spikes. Synergy emphasizes that taste modulation allows brands to meet evolving health and functionality demands while ensuring products remain palatable, supporting repeat purchases and consumer trust.

https://www.nutritioninsight.com/news/synergy-flavors-sugar-reduction-taste-modulators.html



Desserts And Ice Cream Reimagined: Balancing Indulgence, Nutrition and New Sensory Experiences

Desserts and ice cream are undergoing a profound transformation as the industry seeks to reconcile indulgence with nutrition and heightened sensory appeal.

The article underscores how shifting consumer expectations are driving this change: people increasingly want treats that deliver the joy and comfort traditionally associated with sweets, but without the guilt of excessive sugar, fat, or empty calories. This dual demand has prompted manufacturers to reimagine their formulations, blending culinary creativity with nutritional science.

One of the most notable trends is the reduction of sugar, often achieved through natural sweeteners, fruit concentrates,

or innovative sugar-replacement technologies that preserve the familiar mouthfeel and taste. Alongside this, protein enrichment has become a key strategy, with dairy proteins, plant-based alternatives, and even novel sources like microalgae being incorporated to make desserts more functional and satiating.

Functional ingredients such as probiotics, fibre, and adaptogens are also finding their way into frozen treats, positioning ice cream not just as a pleasure food but as a vehicle for wellness.

Equally important is the sensory dimension. Texture, flavour, and visual presentation are being elevated to create multi-layered experiences that surprise and delight. From bold flavour fusions—such as exotic fruits paired with spices—to unexpected textures like crunchy inclusions or whipped airy layers, the focus is on delivering indulgence in new and memorable ways. Visual innovation plays a role too, with vibrant colours, artistic swirls, and playful formats designed to capture attention in a crowded marketplace and appeal to consumers' desire for novelty.

Despite these nutritional and sensory innovations, indulgence remains the heart of the category. Ice cream and desserts are still about pleasure, comfort, and emotional connection, but the definition of indulgence is evolving. It is no longer just about richness or decadence; it is about enjoying something special that also aligns with modern values of health, sustainability, and creativity. This balancing act is shaping a new generation of products that reflect both tradition and transformation, ensuring that desserts and ice cream remain relevant and desirable in a competitive and health-conscious market.

The article ultimately paints a picture of an industry at a crossroads, where success depends on the ability to merge indulgence with innovation. Those who can master this balance—delivering treats that are both nutritionally improved and sensorially exciting—are likely to capture the loyalty of consumers who want it all: pleasure, wellness, and surprise in every bite.

https://www.foodingredientsfirst.com/news/desserts-ice-cream-trends-innovation.html



How AI Is Transforming Sweetener Innovation and Discovery

Artificial intelligence is reshaping the way sweeteners are discovered and developed, moving the process away from lengthy trial-and-error screening toward targeted identification of new compounds.

Effendi Leonard, CEO of 2nd Nature, explains that AI systems can map the molecular composition of agricultural products and surface sweet molecules that traditional screening overlooked. This approach compresses timelines by predicting taste, texture, stability, and functional performance at the same time a molecule is identified, rather than treating these as separate, sequential steps.

The technology is particularly valuable because sensory prediction has historically been the most difficult stage to accelerate, yet it ultimately determines whether a discovery becomes a viable ingredient. AI provides a ranked shortlist of promising candidates, which are then validated through sensory panels and application testing. While stevia and monk fruit remain important tools for sugar reduction, 2nd Nature's work has uncovered sweet molecules in common crops that had not been considered before, offering new sources of sweetness from existing agricultural streams.

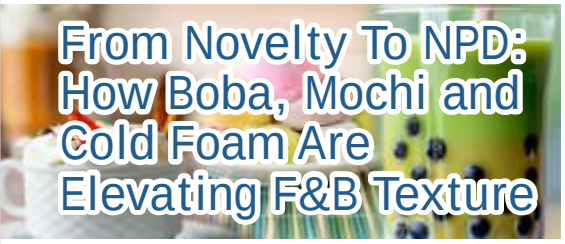
Leonard emphasizes that AI does not replace sensory science but narrows the field of what must be tested manually. Another advantage is the ability to design sweeteners for specific applications, recognizing that sweetness behaves differently in beverages, dairy, bakery, or plant-based products. This targeted approach could help formulators avoid the limitations of trying to adapt one ingredient across multiple categories.

The company sees blending as the most practical near-term opportunity, since sugar contributes bulk, texture, browning, and mouthfeel beyond sweetness. AI-discovered sweeteners are being developed to complement sugar and other systems, enabling reductions without compromising product performance. Early commercial sampling is focusing on beverages and dairy, where aftertaste and sensory performance are particularly sensitive.

2nd Nature's process—Discover, Develop, Deploy—ensures that candidates move from AI identification through food science validation and scalable production before reaching customers. The challenges ahead lie less in discovery than in regulatory approval, manufacturing scale-up, and supply reliability.

Leonard stresses that novel ingredients must still clear regulatory review, and consumers will ultimately judge them by taste, performance, and clean label appeal, just as they would any other food ingredient.

https://www.foodingredientsfirst.com/news/2nd-nature-ai-sweetener-discovery.html



From Novelty To NPD: How Boba, Mochi and Cold Foam Are Elevating F&B Texture

The document explores how textural elements such as boba, popping pearls, mochi, and cold foam are moving beyond novelty and becoming central to mainstream food and beverage innovation.

Initially popularized through bubble tea shops, Japanese confectionery, and coffeehouse culture, these formats are now appearing across beverages, desserts, dairy, confectionery, and packaged foods. Their appeal lies in the ability to transform familiar products into indulgent, interactive experiences without altering the core flavour profile.

Cold foam has emerged as one of the clearest examples of this transition, with coffee chains and retail brands making it widely accessible. Mochi has expanded from a niche Asian dessert into ice creams, bakery items, and confectionery, offering a chewy, premium texture that resonates with consumers. Boba and popping pearls, while still strongly associated with bubble tea, are beginning to find new applications in energy drinks, cocktails, and quick-service restaurant menus, though their broader adoption depends on proving that texture adds lasting value rather than fleeting novelty.

Consumer research highlights strong demand for playful, chewy, and multi-textural experiences, with many seeking indulgent foods that combine sensory enjoyment and surprise. However, commercialization challenges remain. These include maintaining texture through shelf life, ensuring compatibility with manufacturing processes, managing costs, and scaling production. Ingredient suppliers are responding with industrial-ready inclusions and systems designed to withstand processing and distribution.

The overall trajectory suggests that texture is becoming a formulation tool rather than a passing trend. Cold foam and mochi show strong potential for long-term integration into mainstream categories, while boba and popping pearls face a more nuanced path, requiring innovation in applications that make their interactive qualities central to the product experience. The shift reflects a broader industry move toward elevating sensory appeal as a driver of differentiation and consumer loyalty.

https://www.foodingredientsfirst.com/news/from-novelty-to-npd-how-boba-mochi-and-cold-foam-are-elevating-fb-texture.html



Oleosomes Emerge as Multifunctional Plant-Based Fat Alternative

The document highlights oleosomes, natural oil bodies found in seeds, as multifunctional plant-based fat alternatives.

Oleosomes differ from conventional fats because they remain enclosed in their native protein and phospholipid membranes, allowing them to deliver fat, emulsification, texture, and sensory performance in a single system. This structure enables them to replicate creaminess, lubrication, and melting behaviour similar to dairy and tropical fats, while also supporting stability and clean-label formulation.

Botaneco's water-based process preserves intact oleosomes and separates protein-rich streams, supporting whole-seed utilization rather than focusing on refined oils alone. In trials, oleosomes have shown strong performance in plant-based dairy beverages, ice cream, and cheese prototypes, replicating creaminess, meltability, and stretchability comparable to traditional dairy fats. They have also demonstrated success in plant-based meat analogues, enhancing juiciness and reducing oil loss during extrusion.

Industrial testing has confirmed that oleosomes withstand high shear, pressure, and ultra-high temperature processing, while offering improved stability over existing plant-based milks. Their concentrated emulsion form means manufacturers can often introduce them at the same stage as vegetable oils, sometimes simplifying processes by removing the need for pre-emulsification.

While oleosomes are not suitable for all applications—such as low-moisture systems requiring laminating fats—they are already proving versatile across dairy alternatives and meat analogues. Botaneco sees no further technical breakthroughs as necessary for adoption, with commercialization now focused on validation, partnerships, and scaling production. Early opportunities are expected in categories where oleosomes provide clear functional advantages, including beverages, creamers, yogurts, ice cream, cheeses, and plant-based meats. The company's strategy emphasizes cost competitiveness, sustainability, and multifunctionality, positioning oleosomes as a promising alternative to conventional fats and emulsifiers.

https://www.foodingredientsfirst.com/news/oleosomes-plant-based-fat-alternative.html



Protein Innovation Enters Diversification Era as Quality and Functionality Overtake Quantity

Protein innovation is entering a diversification era where the focus is shifting from simply increasing protein grams to improving quality, functionality, and consumer experience.

For years, the debate centred on animal versus plant protein, but companies are now embracing a wider mix that includes dairy, plant, fungal, yeast, and precision fermentation-derived proteins. The aim is not to find a single dominant source but to select or combine proteins that best fit specific product needs, whether that means taste, texture, nutrition, or cost efficiency.

Consumer demand remains strong, with protein claims growing steadily across categories such as cereals, dairy, and meat substitutes, and even extending into soups and hot drinks. However, expectations are evolving: people want better amino acid profiles, digestibility, satiety, and health benefits, alongside appealing taste and texture. Hybrid proteins are gaining traction as formulators blend dairy and plant proteins or combine different plant sources to balance nutrition, sensory appeal, and affordability.

Cost pressures are also driving diversification. Whey protein, long a staple in sports nutrition, faces supply constraints and rising prices, prompting exploration of alternatives like pea, rice, yeast, and fermentation-derived proteins. Fermentation is moving closer to the mainstream, with biomass proteins such as Fermotein gaining EU approval, and precision fermentation producing highly functional proteins like OvoPro, which replicate egg white properties such as binding and foaming.

The future of protein is not about one source replacing another but about flexibility. Dairy will remain important, plant proteins will expand, and fermentation-derived proteins will grow where they can deliver both nutritional and technical advantages. The strongest opportunity lies in offering protein that tastes good, performs well in formulations, fits price points, supports health benefits, and comes from reliable supply chains. In this new phase, the message is no longer "more protein" but "better protein," reflecting a more mature and diversified market.

https://www.foodingredientsfirst.com/news/protein-innovation-diversification-quality-functionality.html



The Future of Protein: Industry Shifts Toward a More Diversified Ecosystem

The document outlines how the protein industry is shifting toward a diversified ecosystem where multiple sources—animal, dairy, plant, and fermentation-derived proteins—are seen as complementary rather than competing.

Rising consumer demand for protein is coupled with pressures around cost, supply resilience, sustainability, and sensory performance, pushing manufacturers to move beyond

Combining proteins allows companies to improve amino acid profiles, digestibility, texture, and taste while also balancing cost and supply challenges.

Consumers are increasingly focused on outcomes such as muscle health, satiety, healthy aging, and overall wellness, rather than just the number of grams on a label. This is driving interest in hybrid solutions that blend plant and animal proteins, or combine proteins with other functional ingredients like fibre, to deliver nutrient-dense products with holistic benefits.

Industry voices emphasize that dairy proteins will continue to hold a premium position due to their complete amino acid profile and proven functionality, but they will increasingly be used alongside plant and fermentation-derived proteins.

Plant proteins such as soy, pea, and faba bean are gaining traction, especially when combined to deliver complete amino acid profiles and improved sensory qualities. Fermentation-derived proteins, including precision-fermented egg white proteins, are highlighted for their ability to replicate technical functions like binding, foaming, and gelling.

Hybrid products are expected to play a major role, offering familiar formats like burgers or beverages with enhanced nutrition and reduced fat. Taste and texture remain critical, as consumers will not accept products that compromise sensory appeal, regardless of health or sustainability claims. Commercial success will depend on reliable supply chains, cost competitiveness, and delivering products that consumers genuinely enjoy.

Overall, the future of protein is framed as flexible and diversified, with success coming from leveraging the strengths of multiple sources to meet evolving nutritional, functional, and consumer expectations.

https://www.foodingredientsfirst.com/news/future-protein-diversified-protein-ecosystem.html



Chicken Breast Protein Smoothie Defies Category Boundaries

MUST in Thailand has introduced a ready-to-drink chicken breast protein smoothie that blends steamed chicken with yoghurt at high speed to achieve a fine, milk-like consistency.

Each bottle contains up to 60 grams of protein, making it one of the most protein-dense beverages available.

The product is aimed at gym-goers and busy consumers seeking convenient, high-protein nutrition, and it comes in a variety of flavours such as strawberry, blueberry, mango passionfruit, Thai tea, matcha, and coffee.

The smoothies are lactose-free, contain no added sugar, and include prebiotic fibres, with several flavours designed to be keto-friendly. The drink is recommended to be consumed cold for optimal texture and appeal in hot climates.

Initially launched in Thailand in June 2026, distribution is through gyms, health stores, fitness centres, and online platforms, with expansion to markets like Hong Kong planned.

While the concept of “drinking chicken” may deter some consumers, the company has also developed a plant-based alternative called Power Plant, made from almonds and peas, offering 35 grams of protein per serving.

These plant-based smoothies avoid soy, are lactose-free, and come in flavours such as cacao, Thai tea, and acai. They provide a full amino acid profile and naturally occurring BCAAs, though they rely on pea protein isolate rather than whole food protein.

The innovation has already been recognized with a taste Innovation award at ThaiFex-Anuga Asia 2026, highlighting its potential to redefine boundaries in the protein beverage category.

https://www.foodnavigator.com/Article/2026/07/07/must-rtd-chicken-breast-protein-smoothie/





REGULATORY NEWS

FSSAI Crackdown Sends Food, Beverage Firms Back to Drawing Board

India's food and beverage industry is being reshaped by intensified enforcement from the Food Safety and Standards Authority of India (FSSAI).

Companies across categories—from staples like atta, paneer, and ghee to packaged foods, chocolates, juices, and even alcoholic beverages—are being compelled to revisit product labels, packaging, and advertising claims. Much of this scrutiny is not due to new rules but to the implementation of standards that have existed for years, now backed by stronger testing infrastructure and a more mature regulatory ecosystem.

Key flashpoints include terms such as "100% pure" and "energy," which regulators argue may mislead consumers, particularly children in the case of energy drinks. Firms like Dabur and Diageo have challenged regulatory orders in court, while others are redesigning packaging and marketing campaigns to comply.

Online retailers have already begun disabling listings of affected products, showing how enforcement can disrupt sales and damage consumer confidence. Energy drink makers such as Red Bull and Sting Energy have been directed to remove the word "energy" from labels and ads, highlighting the scale of impact on a category worth an estimated ?13,000 crore.

The crackdown is also being amplified by consumer behaviour. Shoppers are reading labels more closely, while social media influencers, nutrition experts, and independent testing are intensifying scrutiny. This has raised the stakes for companies, as regulatory action now carries reputational risks beyond compliance costs.

Nestlé India has framed the shift as an opportunity to strengthen consumer trust through transparent communication, while public health experts continue to push for front-of-pack warnings on foods high in sugar, salt, and saturated fat. The Supreme Court has also recommended such disclosures, though India still lacks clearly defined nutrient thresholds for HFSS foods.

Alcoholic beverages are not exempt, with brands like Bagpiper Deluxe Whisky and Old Cask Deluxe XXX Rum facing questions over flavouring standards. Industry representatives argue that clearer directions and sufficient transition time are needed to manage label changes.

Overall, the enforcement trend points toward simpler, more transparent communication and evidence-backed claims, forcing companies to reassess how they market products while regulators balance consumer protection with predictable compliance requirements.

https://economictimes.indiatimes.com/industry/cons-products/food/fssai-crackdown-sends-food-beverage-firms-back-to-drawing-board/articleshow/133048524.cms



The Food Fortified Frontier: Corporate India's Next Major FMCG Growth Engine

The food fortification in India is evolving from a regulatory obligation into a strategic growth engine for FMCG companies.

Traditionally seen as a public health measure, fortification is now being leveraged by certain processors as a way to build consumer trust, differentiate products, and raise industry standards. Research by Endeva, based on the Millers for Nutrition initiative across Asia and Africa, identifies "Champion Millers" who go beyond compliance. These companies share three traits: leadership that prioritises nutrition as a long-term business goal, a commitment to quality as a differentiator, and strong technical excellence.

Two Indian examples illustrate this shift. ShyamaTara Rice Mills, known for supplying fortified rice to government programmes, expanded into the retail market by creating a consumer brand aimed at mainstream households.

By investing in marketing, e-commerce, and partnerships with dieticians and influencers, it repositioned fortified rice as a health-conscious choice rather than a welfare product. Kaleesuwari Refinery took a different approach, redesigning its fortification process to improve quality control. After discovering inconsistencies in premixes, it began sourcing vitamins separately and blending them in-house, investing in automated dosing systems to ensure consistency. Although this doubled input costs, the company absorbed them rather than passing them on, reinforcing its reputation for quality.

The broader lesson is that companies treating nutrition and quality as strategic assets can influence industry practices and consumer perceptions. Investments in traceability, automation, and assurance not only strengthen competitiveness but also create opportunities for differentiation in crowded markets. The study underscores the importance of supportive ecosystems, where government recognition, independent benchmarking, and collaboration between regulators and industry can align commercial incentives with public health goals. Ultimately, progress in fortification—and food systems more broadly—comes not just from stricter regulations but from creating conditions where doing the right thing also makes business sense.

https://www.thehindubusinessline.com/economy/agri-business/the-food-fortified-frontier-corporate-indias-next-major-fmcg-growth-engine/article71319228.ece



Clean Label Enters Redesign Era as Formulators Tackle Taste and Texture Trade-Offs

The article examines how clean label reformulation has evolved from simply removing additives to a more holistic redesign of food and beverage products.

Manufacturers are now expected to balance shorter, simpler ingredient lists with consumer demands for taste, texture, nutrition, and shelf life. Globally, clean label is most associated with natural ingredients, fewer additives, and environmentally friendly positioning, but expectations vary by region. In Europe, scrutiny focuses on additives and sourcing; in North America, transparency and avoidance of artificial ingredients dominate; while in Asia-Pacific, consumers emphasize both “minus” claims like reduced sugar and preservatives and “plus” claims such as added fibre, protein, and fermented ingredients.

Industry experts describe clean label reformulation as a process of removing unwanted ingredients, rebuilding lost functionality, and adding nutritional or sensory value. Sugar reduction illustrates the challenge: sugar contributes not only sweetness but also viscosity, binding, browning, and mouthfeel, so replacing it requires integrated solutions rather than one-to-one swaps. Functional starches, fermentation-derived ingredients, and AI-assisted formulation are being used to overcome these trade-offs. Examples include Samyang’s corn-syrup-free caramel prototype, Tate & Lyle’s gelatin-free yogurt using clean label starches, Kerry’s prepared-meal project with culinary stocks, and Ingredion’s clean label dips using native starches and citrus fibre.

AI is playing a growing role in optimizing formulations, reducing prototyping cycles, and helping brands balance sugar reduction, cost, and sensory performance. Looking ahead, multifunctional ingredients that deliver several benefits at once, such as allulose for sweetness and browning, are expected to drive the next generation of clean label innovation. The future direction is described as “clean label without compromise,” where success depends not on the shortest ingredient list but on clarity, functionality, and consumer trust in the choices that matter most.

https://www.foodingredientsfirst.com/news/clean-label-food-reformulation-innovation.html



Peru’s Front-Of-Pack Warning Labels Drive Food Industry Reformulation

PFNDAI Oct 2026

Peru’s mandatory front-of-pack (FOP) warning labels have had a measurable impact on the country’s packaged food industry, driving reformulation toward healthier nutrient profiles.

Introduced in June 2019, the policy requires black warning labels on products exceeding thresholds for sugar, sodium, saturated fats, or containing trans fats.

A study by the University of North Carolina's Global Food Research Program tracked 3,805 products before and after implementation, finding that the proportion of foods carrying at least one warning label fell from 61% to 55%, while beverages dropped from 31% to 19%. Products high in sugar decreased by 10% among foods and 37% among beverages, with sodium and saturated fat also showing declines.

These changes reflect reformulation rather than replacement of old products, strengthening evidence that clear labelling policies compel manufacturers to improve existing items. Peru's approach was reinforced by complementary measures: a 2016 trans-fat elimination mandate, a 2018 sugar-sweetened beverage tax increase, advertising restrictions requiring warning labels across media, and a 2019 ban on labelled products in school shops and cafeterias.

Researchers conclude that even modest nutrient reductions across a national food supply can yield meaningful public health benefits. Peru's case aligns with similar outcomes in Chile and Mexico, showing how regulatory pressure in middle-income countries can reshape industry practices. Globally, the trend mirrors initiatives such as the UK's expanded Soft Drinks Industry Levy and ongoing US proposals for standardized front-of-pack labelling, underscoring the growing role of policy-driven reformulation in tackling diet-related health risks.

https://www.foodingredientsfirst.com/news/peru-nutrition-packaged-foods-salt-sugar.html



US Food Labelling Modernization Act Proposes Standardized Front-Of-Pack Labels and Clearer Ingredient Disclosures

The Food Labelling Modernization Act of 2026 represents one of the most ambitious attempts in decades to overhaul U.S. food labelling standards.

Introduced by Senators Richard Blumenthal and Cory Booker, the bill seeks to address outdated regulations that have remained largely unchanged for more than 35 years. Its central feature is the creation of a standardized front-of-pack nutrition labelling system, designed to give consumers quick, clear insight into a product's nutritional value while shopping.

The proposal also calls for updated serving sizes that reflect modern eating habits, clearer allergen disclosures, and stricter ingredient transparency. It would limit the use of vague catch-all terms like "artificial flavour" or "spices" and require more precise definitions. Another major element is the introduction of standardized definitions for "ultra-processed" and "not ultra-processed," aiming to reduce consumer confusion and prevent misleading marketing claims.

The legislation builds on broader U.S. nutrition policy shifts, including FDA efforts to modernize labelling, federal initiatives to phase out synthetic food dyes, and renewed focus on diet-related health outcomes. It also addresses the rise of online grocery shopping by requiring that the same nutrition and ingredient information available on physical packaging be displayed to consumers purchasing food online.

Supporters, including the Center for Science in the Public Interest, argue that the bill would empower consumers to make healthier choices and curb deceptive practices that make processed foods appear more nutritious than they are.

If enacted, the Food Labeling Modernization Act would mark the most significant reform of U.S. food labelling policy in over three decades, with wide-ranging implications for manufacturers, retailers, regulators, and consumers alike.

https://www.foodingredientsfirst.com/news/us-food-labeling-modernization-act.html



UPF Regulation Revolution

The regulation of ultra-processed foods (UPFs) is moving from scientific debate into concrete policy.

Governments worldwide are drafting definitions and exploring rules that go beyond nutrients to consider how foods are processed.

The US Food and Drug Administration is working on a federal definition, which could become the foundation for future policies on labelling, procurement, school meals, and litigation. California has already passed legislation requiring statutory definitions of UPFs for school food, with implementation planned from 2029 to 2035.

Internationally, Brazil is pressing the World Health Organization to strengthen recommendations on children's marketing and school food environments, while the European Commission has launched a study under its Safe Hearts initiative. The UK has acknowledged links between UPFs and poor health outcomes but remains cautious about regulating based solely on processing.

The report highlights that litigation is emerging as another front, with cases such as San Francisco's lawsuit against major food companies alleging harm from UPF marketing. For manufacturers, the challenge is that reformulation around nutrients may no longer be sufficient: products could still be classified as UPFs regardless of sugar reduction or added fibre.

The next 12 to 18 months are expected to be pivotal, with the FDA definition, state-level legislation, European developments, and WHO discussions all shaping the landscape.

The article concludes that food regulation is expanding from what products contain to how they are made, and companies that prepare early will adapt more successfully than those waiting for final laws.

https://www.foodnavigator.com/Article/2026/07/07/how-upf-regulation-could-reshape-the-global-food-industry/



Three-Way Fight Over UPF Definition

The article explores how the US Food and Drug Administration is grappling with competing proposals to define ultra processed foods (UPFs), a decision that could reshape the food industry and public health policy.

At stake is not just a technical definition but the framework that will underpin labelling, nutrition guidance, procurement standards, and even litigation. The debate is complex because UPFs sit at the intersection of science, consumer perception, and regulatory authority, and each stakeholder group brings a different lens to the issue.

Some advocates argue that the defining characteristic of UPFs should be the extent of industrial processing—mechanical, chemical, or thermal interventions that fundamentally alter the food from its original state. This perspective aligns with the NOVA classification system, widely used in academic research, which categorizes foods by processing level rather than nutrient content. Others insist that ingredient composition should be the focal point, pointing to additives such as emulsifiers, stabilizers, and artificial sweeteners as markers of ultra processing. A third camp emphasizes nutrient profiles, suggesting that foods high in sugar, salt, or saturated fat should be prioritized in regulation regardless of how they are made. Still others advocate for hybrid definitions that combine all three dimensions, arguing that only a multifactor approach can capture the complexity of modern food systems.

The implications of whichever definition prevails are profound. If processing methods dominate, many reformulated products that meet nutrient targets could still be classified as UPFs, potentially undermining industry efforts to reduce sugar or fat. If nutrient composition is prioritized, manufacturers may focus narrowly on reformulation without addressing broader concerns about additives and industrial techniques. Ingredient based definitions, meanwhile, could push companies to eliminate certain compounds entirely, reshaping product development pipelines.

The FDA's deliberations are occurring alongside parallel efforts by the USDA and state governments, creating a fragmented regulatory landscape. California has already passed legislation requiring statutory definitions of UPFs for school food programs, while other states are considering similar measures. This three way contest between federal, state, and agricultural authorities underscores the political and economic stakes,

as definitions will determine not only consumer labelling but also eligibility for government contracts, school meal standards, and public health campaigns.

The debate also reflects growing consumer awareness. Advocacy groups and researchers have linked UPFs to obesity, diabetes, and other chronic conditions, fuelling calls for stricter oversight. Social media and public discourse have amplified these concerns, making UPFs a cultural as well as scientific issue. For manufacturers, the uncertainty is challenging: reformulation strategies, marketing claims, and long term product development all hinge on how regulators ultimately draw the line.

In essence, the FDA's decision is about more than semantics. It will shape the trajectory of food innovation, determine how consumers understand the products they buy, and influence whether the US aligns with international frameworks or carves out its own path. The outcome will reverberate across supermarket shelves, school cafeterias, and corporate R&D labs, marking a pivotal moment in the evolution of food regulation.

https://www.foodnavigator.com/Article/2026/07/17/fda-weighs-competing-definitions-for-ultra-processed-foods/



The article reviews the ongoing debate around the safety of synthetic food dyes and the regulatory shift away from petroleum-based colorants.

In April 2025, the U.S. Department of Health and Human Services and the FDA announced plans to phase out synthetic dyes in food, citing long-standing concerns about possible neurobehavioral and carcinogenic effects. This move reflects growing public scrutiny and consumer demand for cleaner, naturally derived alternatives.

The decision marks a turning point in food regulation, as synthetic dyes have been widely used for decades to enhance the visual appeal of products ranging from cereals and candies to beverages and baked goods. While these additives have long been considered safe at approved levels, mounting evidence from epidemiological studies and consumer advocacy groups has raised questions about their impact on children's behaviour, potential links to hyperactivity, and broader health risks. The FDA's announcement signals a shift toward precautionary regulation, prioritizing consumer trust and public health over industry convenience.

Major food companies have already begun transitioning, with Nestlé among those announcing plans to remove synthetic colours from products. This transition is not without challenges. Natural alternatives such as beet juice, turmeric, spirulina, and anthocyanins offer vibrant hues but often lack the stability, intensity, and shelf-life performance of synthetic dyes. They can be sensitive to light, heat, and pH, which complicates formulation and manufacturing. As a result, food scientists are working to improve extraction methods, encapsulation technologies, and blending techniques to make natural colours more reliable and commercially viable.

Researchers continue to examine both the risks associated with artificial dyes and the viability of natural replacements, which must balance safety, stability, and sensory appeal. The discussion highlights how food colour regulation intersects with consumer health perceptions, industry reformulation challenges, and broader trends toward transparency and clean labels. The move away from synthetic dyes also reflects a cultural shift: consumers increasingly equate bright, artificial colours with "processed" foods, while natural hues are seen as markers of authenticity and wellness.

Ultimately, the debate over food dyes is emblematic of a larger transformation in the food industry. It underscores the growing influence of consumer advocacy, the role of scientific research in shaping policy, and the pressure on manufacturers to innovate responsibly. As synthetic dyes are phased out, the industry faces both a challenge and an opportunity: to reimagine how food looks, tastes, and communicates trust in an era defined by health-conscious choices and demand for transparency.

https://www.ift.org/food-technology-magazine/examining-the-safety-of-food-dyes



Paradigm Shift: Next Frontier of Probiotics Lies in Traceability and Functionality – TCI

TCI is positioning the next stage of probiotic innovation around traceability and functionality rather than simply proving survival through the digestive tract.

At the Growth Asia Summit 2026, R&D Manager Lucas Chang explained that traditional probiotic delivery focused on engineering solutions to ensure microbes reached the intestine alive. The new frontier is about tracing what happens afterward—mapping the "evidence chain" from microbial function to bioactive compound production, host response, and measurable impact at distant sites. This shift is particularly relevant for healthy aging, where resilience depends on how the body recovers between biological challenges.

Chang highlighted two major transition points in aging: around the 40s, when lipid and alcohol metabolism and cardiovascular health begin to shift; and around the 60s, when immune regulation, carbohydrate metabolism, and oxidative stress pathways undergo disruption.

Probiotics designed for these contexts must do more than survive—they must actively support resilience against chronic and acute stresses.

TCI's patented strain TCR711 (Bacillus coagulans TCI711) exemplifies this approach. In a clinical study with adults suffering from non-alcoholic fatty liver disease, supplementation improved liver-fat outcomes by 8.7% compared to placebo, while also shifting gut ecology toward short-chain fatty acid producers. In another trial, participants challenged with whiskey after a week of supplementation showed faster alcohol clearance, with enzymatic activity linked to alcohol metabolism detected in the strain.

Delivery formats are also evolving. TCI showcased liquid probiotic chocolate as a consumer-friendly matrix that supports microbial survival while integrating probiotics into daily habits. The lipid-rich, low-moisture environment protects the strain, while the familiar format encourages consistent consumption.

Chang emphasized that probiotic design should begin with the desired health outcome, trace the biology backward, and then build the strain and delivery system around that function. This marks a paradigm shift from supplement engineering to lifestyle-integrated, function-driven probiotic innovation.

https://www.nutraingredients.com/Article/2026/07/20/tci-says-next-frontier-of-probiotics-lies-in-traceability-and-functionality/



Ashwagandha Armed with Critical Safety Data as Industry Anticipates Europe-Wide Assessment

The article you're viewing highlights how ashwagandha is entering a critical regulatory phase in Europe, backed by a growing body of safety and clinical data.

On July 14, experts met with policymakers at the European Parliament to advocate for a science-led, proportionate, and evidence-based approach to regulation. The industry has built substantial clinical evidence that could be pivotal if European regulators initiate a safety review of the herb.

This push comes amid wider debates and regulatory actions worldwide. In India, for example, the Karnataka High Court recently stayed a government restriction on ashwagandha leaves, while companies like Kerry Group have launched initiatives to dispel misinformation and reinforce safety narratives. The European discussion reflects the sector's determination to ensure that regulation is guided by robust data rather than precautionary bans or misconceptions.

The meeting underscores that the future of ashwagandha in Europe will likely hinge on how effectively the industry can demonstrate traceable, evidence-backed safety outcomes. With regulators considering continent-wide assessments, the herb's established clinical portfolio could play a decisive role in shaping its regulatory acceptance and long-term market stability.

https://www.nutraingredients.com/Article/2026/07/16/ashwagandha-armed-with-critical-safety-data-as-industry-prepares-for-europe-wide-assessment/



FDA Admits Defining Ultra-Processed Foods is 'Challenging', Says It Won't Ban Them

The FDA has acknowledged that defining ultra-processed foods (UPFs) is proving far more complex than anticipated, and it has confirmed that it does not plan to ban them.

At the IFT First trade show in Chicago, Donald Prater, the agency's acting deputy commissioner for food, explained that the challenge lies in the lack of a standardized definition. Multiple frameworks exist, such as the Nova classification, but they often group together nutritionally diverse products — from whole-grain cereals and plant-based milks to candy bars and sodas — under the same UPF label, which many experts argue is misleading.

The FDA is working with the USDA and other agencies to evaluate proposals that could make sense scientifically, while emphasizing that its role is to ensure food safety, truthful labelling, and informed consumer choice. Despite calls from some policymakers and advocacy groups to restrict or ban UPFs, the agency reiterated that it will not pursue prohibition. Instead, it is prioritizing clarity in definitions, given that UPFs currently account for more than half of Americans' daily calories and are a growing public health concern.

Alternative classification systems, such as Wisecode's tiered approach and verification labels like the UPF Standard, have emerged to address consumer confusion. Meanwhile, political pressure continues, with Congress considering bills to limit marketing of UPFs to children and require warning labels. The FDA's eventual definition, though still pending, will be critical for shaping future food policy and industry compliance, reflecting the complexity of categorizing foods that range from nutrient-rich fortified products to indulgent snacks.

https://www.greenqueen.com.hk/fda-ultra-processed-foods-definition-ban-regulation/



Roughly 80% Of US Food Products Will Be Labelled GMO By 2028

A U.S. federal court has ruled that the Department of Agriculture must rewrite its GMO food labelling rules by 2028, finding that the current framework fails to provide consumers with clear and accessible information.

The decision criticized the use of terms such as "bioengineered" and the reliance on QR codes for disclosure, arguing that these approaches are confusing and inadequate for transparency at the point of purchase. The court emphasized that consumers should be able to understand whether a product contains genetically modified ingredients directly from its packaging, without needing digital tools or specialized knowledge.

The ruling is expected to have significant implications for food companies, which will need to redesign packaging and labelling to meet stricter standards. It also reflects broader shifts in consumer expectations, with growing demand for straightforward, evidence-based communication about food production methods. The USDA now faces the challenge of balancing industry concerns with the court's directive to ensure that GMO labelling is both clear and meaningful. This development is likely to influence not only domestic food regulation but also international trade, as many countries already enforce more explicit GMO disclosure requirements. The case marks a turning point in U.S. food policy, signalling that transparency and consumer rights will take precedence over industry preferences in future labelling practices.

https://www.foodnavigator.com/Article/2026/08/10/court-orders-usda-to-rewrite-gmo-labeling-by-2028/

