PFNDAI

FOOD, NUTRITION & SAFETY MAGAZINE

BULLETIN APR 2026

CHICKPEA PROTEIN AS FOOD INGREDIENT

Dr. Malathy Venkatesan

REGULATORY ISSUES IN EXPORTING FOOD PRODUCTS

Ms Meenu Yadav & Ms Reshma Poothatta

UTILISATION OF THE FOOD WASTE: CHALLENGE AND OPPORTUNITY

Dr. Shashank Bhalkar

EMERGING SUSTAINABLE SOURCES OF OMEGA-3 FATTY ACIDS:

Prof Jagadish Pai

FROM TRADITION TO TECHNOLOGY: THE NEXT CHAPTER IN OAT INNOVATION

Ms. Anuja N Padte

LABELLING AND CLAIMS FOR HEALTH FOODS

Ms Sanyukta Telange & Ms Dolly Soni

FOOD FORTIFICATION IN INDIA: STANDARDS AND PERSPECTIVES

Ms Simran Vichare

REPORT OF NUTRITION AWARENESS ACTIVITY ON "DAIRY 2.0: THE SYNERGY OF NUTRITION, INNOVATION, AND QUALITY"

Ms Anuja Padte

PROTEIN FOODS AND NUTRITION DEVELOPMENT ASSOCIATION OF INDIA

2nd Floor, Mahalaxmi Chambers, 22 Bhulabhai Desai Rd., Mumbai - 26 (India)
Phone: 022 23538858 / 23519014
Email: pfndai@pfndai.org Website: www.pfndai.org

FINE ORGANICS

Finamul® 1909

A Safe & Sustainable Alternative to Lecithin for Chocolate Manufacturers

Finamul®1909 is Fine Organic's specialized Ammonium Phosphatide, developed to effectively replace lecithin while giving manufacturers superior control over chocolate rheology. It optimizes flow properties, reduces viscosity and enhances Casson yield value, enabling smoother processing and consistent performance.

Why Choose Finamul® 1909 Over Lecithin ?

- No adverse impact on flavour, even at higher dosages
- Lower viscosity for improved flow properties
- Reliable batch-to-batch consistency
- Excellent microbiological safety due to high temperature processing
- Easy handling; pumpable at room temperature
- Free from residual oil, taste and odour
- Higher oxidative stability

Applications

- Moulded Chocolates
- Chocolate Enrobing & Coating
- Chocolate Paste & Spreads

FINE Food Ingredients

Tel: +91 (22) 2102 5000 Extn. 100
Email: info@fineorganics.com
Web: www.fineorganics.com
Address: Fine House, Anandji Street, Off. M. G. Road, Ghatkopar East, Mumbai - 400 077, India.

FIL
Flavours

taste stimulate the secretion of digestive juices
this pleasant experience provide mouth watering...
indication of enjoyment of food

taste is a valued concept in food..... creating consumer appeal
through taste is our speciality

We work intimately with the nature in creating unique, innovative functional flavour systems that excite the palate - taste and create new sensations to all processed foods and beverages that goes a long way in market success and creating brand value.....

FOOD INGREDIENT SPECIALITIES PRIVATE LIMITED
No. 90, Vanagaram - Ambattur Road, Ayanambakkam,
Chennai - 600 095. India

FIL
Flavours

Tel : 044 - 26531336 / 2653 0572 / 2653 0451 / 2653 0452
email : info@foodingredientspecialities.com / foodinfil@gmail.com

Complan

zydus wellness

Thoda Plan

Thoda Complan

CLINICALLY PROVEN
2X FASTER GROWTH*

CONTAINS VITAMINS

WITH 34 VITAL NUTRIENTS

SUPPORTS & MEMORY CONCENTRATION*

MADE WITH MILK PROTEIN

Refer Individual pack for mandatory regulatory & statutory information. Mnemonics are for creative visualization.

*Refers to outcome of a clinical study amongst 800 children over 12 months, published in Ind. J. Nutr. Dietet., (2008), 45, 449, 495 comparing kids who consume usual daily diet vs. kids who consume usual daily diet plus 2 recommended serves (2x33g) of complan. Protein in Complan is sourced from milk.

Circulated to PFNDAI Members Only
PFNDAI is not responsible for the authenticity and correctness of the information published and the views expressed by the authors of the articles.
Email : pfndai@pfndai.org Website : www.pfndai.org

PFNDAI Bulletin APR 2026
FOOD, NUTRITION & SAFETY MAGAZINE
Editor: Dr J S Pai | Asst. Editor: Dr Malathy Venkatesan

EDITORIAL BOARD
Dr. J. Lewis
Ms. Shipra Sehgal
Dr. R. Govindarajan
Dr. Shobha Udipi
Dr N Ramasubramanian
Dr. Bhavna Sharma
Dr. V. Krishnakumar
Ms. Naaznin Husein
Dr. Sanjog Surve

INDEX

ADVERTISERS
Fine Organic Industries Ltd,
Food Ingredient Specialities,
Marico,
Vasta Biotech,
Mondelez,
Zydus Wellness,
Modern Dairies,
Bee Pharmo Labs,
Kellogg's &
Nutricircle

Images © Freepik.com

GOVERNING BOARD

CHAIRPERSON: Dr Shatadru Sengupta, Hardcastle Restaurants
VICE CHAIRPERSON: Mr Nikhil Kamat, Fine Organics
HON TREASURER: Dr Prabodh Halde, Marico Limited
ADVISOR: Dr. J. Lewis, Chairman, Scientific Advisory Committee, PFNDAI

ELECTED MEMBERS:
Mr. Prashant Bhat, Mother Dairy
Mr. Indranil Chatterjee, IFF
Mr. Jitin Garg, Mondelez
Dr Sakshi Bhushan, HUL
Mr. Yogish B. T, Herbalife
Mr. Rajesh Kamat, Tata Chemicals
Ms. Nirupama Sharma, Amway
Mr. R. Phani Kumar, Zydus Wellness
Dr. Kavita Tarade, DSM Firmenich

CO-OPTED MEMBERS:
Mr. C. S. Jadhav, Nutricircle
Mr. Swarn Singh, Kellogg's
Mr. Purnachand, Barentz
Dr. Agatha Betsy, ITC
Ms. Manasa, Britannia
Mr. Sunil Adsule, Reliance

CO-OPTED PAST CHAIRPERSON:
Dr. J. Lewis, Ex Marico
Dr. G. M. Tewari, Ex Coca cola
Mr. Bhupinder Singh, Vista Foods
Mr. Sakhavalkar, Ex Novartis
Mr. R. D. Shenoy, Ex Cadbury
Dr. Sanjog Surve, Ex Abbott

Cover Design & Layout by Ms. Leena Shanbhag

DAIRY MILK IS HEALTHY & NUTRITIOUS

Some of the social media influencers have been criticizing dairy milk for many reasons, calling it unsafe etc. There are many reasons for some people to restrict consumption of milk. However, for most others it is a very healthy and nutritious food for all ages.

Some people are lactose intolerant, so they need to restrict consumption of normal milk. However, they can consume lactose-free milk that is now available.

They can also consume milk with lactase drops that are now easily available. This lactase will digest lactose from milk and will not cause any bloating or other problems of lactose intolerance.

They can also consume fermented milk products such as curd or yogurt, cheese etc.

in which much of the lactose is converted to lactic acid or removed with whey. Also, these fermented products would have lactase enzyme and/or lactic acid bacteria that digest lactose.

There is a small percentage of individuals who are allergic to milk protein. They can't consume milk unless proteins are predigested. They should avoid consuming any common milk products.

Children may be given soy or other plant-based milk so they can get adequate nutrition. The plant-based milks should be scrutinized to ensure they contain adequate amounts of high-quality protein and other micro-nutrients.

Some criticism is directed due to agricultural practices using chemicals, some being banned, that may come into milk and may cause health problems to consumers. Such practices have come down significantly since FSSAI has taken steps to control them.

Also, larger reputable companies have made their own quality specifications, extensive testing protocols and milk producer awareness programs to ensure that unfit or unsafe milk does not get into their milk supply.

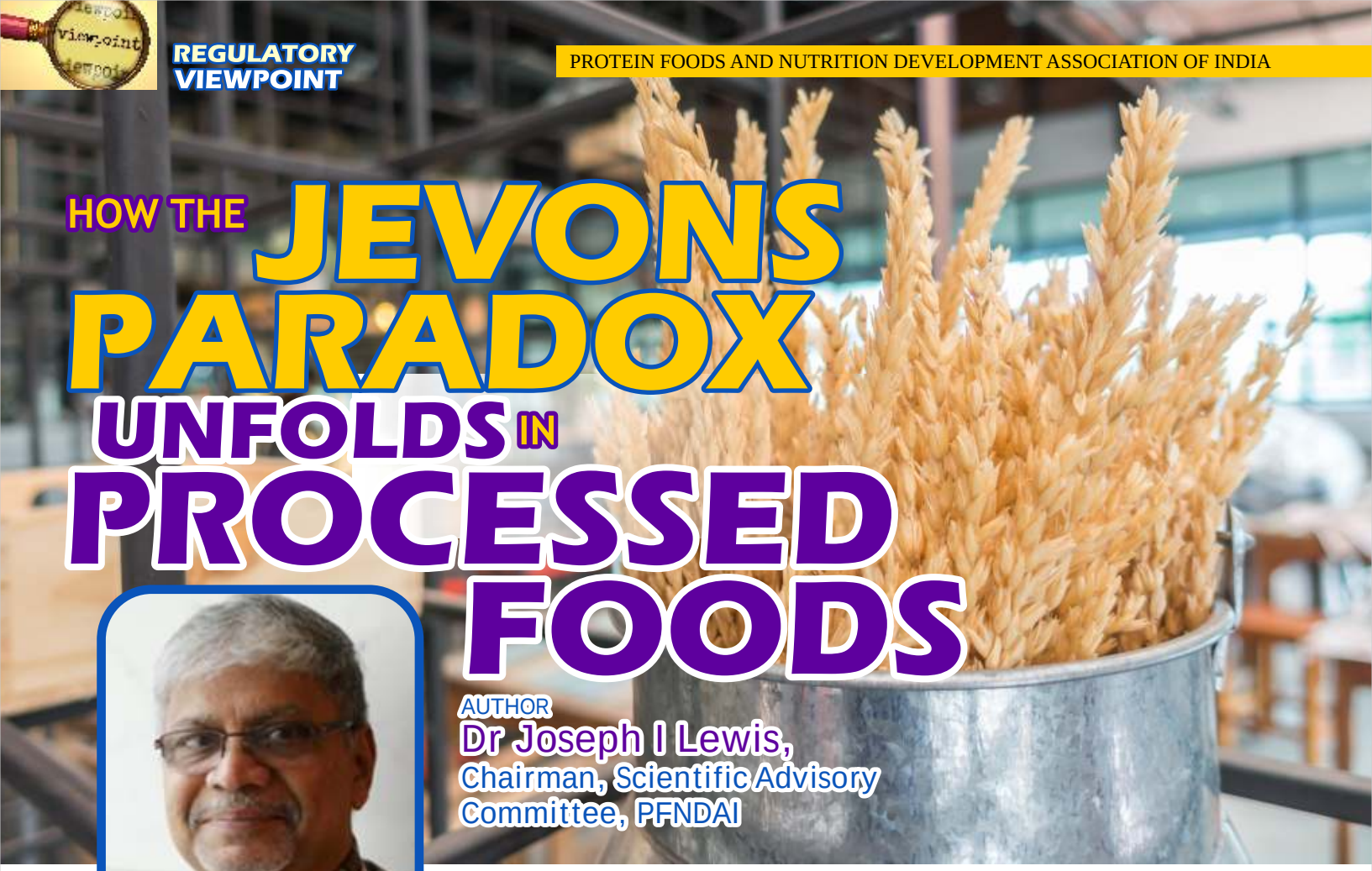
There are however, many loose-milk vendors with very little infrastructure to test may have such problems in their milk supply. FSSAI should ensure that they do proper surveillance to weed out even this. They should also try to create awareness about this among farmers and marketers of loose milk.

There are some consumers who feel that industry may not be able to give them pure milk and want to still go for loose milk. They also should be made aware of the advantages of pasteurization and other safety measures adopted by reputable companies.

Overall, milk production in India has reached the highest level globally and has benefited large number of farmers, consumers and especially the children.

We must stop wrong information being spread about the most valuable & nutrient dense food, with protein, calcium and many vitamins that is available at reasonable cost to masses. Some individuals may have difficulty consuming it but a vast proportion still can derive benefits from it.

Prof Jagadish Pai, Editor, PFNDAI



HOW THE JEVONS PARADOX UNFOLDS IN PROCESSED FOODS

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

Value-added agriculture transforms raw products like wheat into flour (for roti, bread), milk into cheese, or pineapples into jam through processing and packaging. It reduces post-harvest losses, extends shelf life, and creates jobs, thereby increasing the economic value of the original agricultural resource.

Earlier, we lamented that India lags behind global achievements despite ranking high in milk production and being among the top ten countries in tea, coffee, fruits, and vegetables. Value addition of 21% to dairy and 68% to cereals was considered low compared to world averages of 70-90% and 90%, respectively; only 10% fruits are processed. Value addition, meaning better economic benefits from resources, also occurs in several other industries. In the food sector, it is commonly called food processing.

The highest monthly spend, according to HCES (2022-24),is on processed foods(11.4%), compared with cereals (3-5%), vegetables (4-6%), and 7-8% on milk and milk products. Many are alarmed by this. Why so?The rise in expenditure on processed food is a textbook example of the Jevons Paradox and its rebound effects. The expectation that higher costs discourage consumption is a contradiction. Proposed by William Stanley Jevons (1865),it stems from the observation that the efficiency of steam engines increased coal consumption rather than reducing it.

Petrol is another value-added product of crude oil used to fuel cars. When the cost of driving per kilometre decreases, more people buy cars or bigger models, or drive more frequently, increasing total fuel use. It is an economic concept that efficient utilisation of resources tends to increase rather than decrease consumption. This counterintuitive truth applies not just to fossil fuels but also to food. As processing agricultural foods becomes more efficient and cheaper, people eat them more frequently.

This is the rebound effect in the food industry, as in other sectors.

Consumption costs, not purchase price, matter. The most significant "efficiency" gain in processed foods is zero preparation time or time release. The Jevons paradox perfectly illustrates this by framing time as a primary resource.

According to the Time Use Survey (MoSPI, 2024), on average, 75% Indian women spend 289–305 minutes a day (nearly 5 hours) on unpaid domestic work, with cooking being the primary activity.

According to the paradox, the ‘efficiency gain’, i.e., the time released by using processed foods, instead of leading to more free time, is ‘re-consumed’ in gainful employment and the extra earnings available for more processed and restaurant food; the rebound effect.

Second, while a home-cooked thali is approximately 50% cheaper than processed meals, the labour cost is nearly 20 times higher. Valued at market rates, it makes home cooking a luxury of time.

Jevon’s observation remains one of the most persistent "counter-intuitive" truths in modern environmental economics. Fuel efficiency increases vehicular traffic and emissions, contributing to or worsening of chronic obstructive pulmonary disease (COPD). Similarly, the efficiency gains from processed foods coupled with physical inactivity due to a lack of open spaces (urbanisation) contribute to an obesogenic environment.

Current diets are the result of a worldwide transformation in food systems. Feeding a rapidly growing population spurred huge productivity gains in certain food crops, which, upon processing, became available. Government subsidies (PDS) on rice and wheat further widen the price-calorie gap between staples (3-5%) and healthy perishables (4-6%).

To reshape the paradox - an economic reality - regulators and policymakers must incentivise healthful product innovations, rather than binding them to insensible standards and punitive taxation.

CHICKPEA PROTEIN AS FOOD INGREDIENT

AUTHORS
Dr.Malathy Venkatesan,
Project Coordinator,
PFNDAI

Introduction:

Chickpea (*Cicer arietinum L.*) is the third most cultivated and consumed pulses worldwide, after bean and pea, and is commonly commercialized in the form of seeds, flour or canned. India is the largest producer of chickpeas in the world, with estimated 13.04 million tons in 2024, which represents 74.84% of world production, followed by Australia and Turkey. Two varieties are the most explored worldwide; Desi, which is characterized by relatively small angular seeds, with varied and sometimes spotted colours, and Kabuli, which is characterized by larger, smoother, and generally light-coloured seeds. In India, an intermediate type known for its pea-shaped seeds is also popular. Chickpea has been and continues to be consumed by humans since ancient times owing to its good nutritional properties. It is used as food in different styles in different countries, such as chickpea flour for making snacks in India and chickpea is used in stews and soups/salads in Asia and Africa (1).

Nutritional importance of chickpea

Chickpea is abundant in protein, carbohydrates, dietary fibre and vitamins such as thiamine and niacin. It also contains essential minerals such as calcium, iron, phosphorus, magnesium, and potassium (2). Additionally, chickpeas provide both saturated and unsaturated fatty acids, including linoleic and oleic acid, along with polyphenols, and flavonoids. Chickpeas contain starch as the primary carbohydrate, consisting of amylopectin and amylose polymers, contributing to their energy-rich profile. Chickpeas, as for other legumes, also contain antinutritional compounds; examples of these compounds are inhibitors of trypsin and chymotrypsin, as well as phytic acid, which inhibits the absorption of calcium, zinc and iron by the body. Treatment of chickpea seeds or flour, using technological approaches such as thermal processing and extrusion, have been shown to reduce the levels of antinutritional compounds, in addition to modifying the content to

OUR OFFERINGS

nutricircle

Kangni
(Foxtail)

Get the best of protein nutrition for better performance and health

AFTER AIR CLASSIFICATION

- **Protein Fraction 24.24%**
- Starch Fraction 14.69%

Rajgiri
(Amaranth)

The smartest way to consume the goodness of Amaranth protein

AFTER AIR CLASSIFICATION

- **Protein Fraction 31.73%**
- Starch Fraction 14.69%

Rice

Rice Protein Concentrate can be used to generate high value-added proteinaceous products.

- **Rice Protein Concentrate 80%**

Mung Beans
(Blackgram)

The natural goodness of Mung beans. Enjoy high concentration of protein isolate.

AFTER AIR CLASSIFICATION

- **Protein Fraction 39.38%**
- Starch Fraction 14.77%

Masoor Dal
(Orange Lentil)

High functional protein that also helps metabolism

AFTER AIR CLASSIFICATION

- **Protein Fraction 45.03%**
- Starch Fraction 17.69%

Kala Chana
(Horse gram)

Enjoy the miracle benefits of horse gram protein

AFTER AIR CLASSIFICATION

- **Protein Fraction 44.74%**
- Starch Fraction 13.93%

Rajma
(Kidney Beans)

The perfect plant-based protein source

AFTER AIR CLASSIFICATION

- **Protein Fraction 46.07%**
- Starch Fraction 12.71%

Nutricircle Ltd.
5-8-272, Ayesha Residency, Opp. City Convention Centre, Public Garden Road, Nampally,
Hyderabad - 500 001 | Phone: +91 9030528805 | Email: info@nutricircle.in

To know more visit us at www.nutricircle.in

Table 1: Amino acid composition of whole chickpea g/100g protein compared to Whey protein (2), (3)

Amino acid	Chickpea (2)	Whey protein (4)	Soy protein (2)
Histidine	2.51	1.4	2.55
isoleucine	4.34	3.8	4.59
Leucine	7.4	8.6	8.14
Lysine	6.59	7.1	7.18
methionine	1.16	1.8	1.55
Phenylalanine	6.26	2.5	1.44
Threonine	3.55	5.4	3.88
Tryptophan	0.95	1.3	1.8
Valine	4.58	3.5	5.53
cystine	1.27	4.2	1.44

of phenolic compounds; for example, cooking chickpeas under pressure reduces phytic acid content by about 20%.

The traditional processes, germination and fermentation were also effective in reduction in phytate and condensed tannin by more than 30% as per a study reported (3).

Chickpea protein

Chickpeas are considered a good source of dietary protein due to their high protein bioavailability, biological value and well-balanced amino acid profile, while being deficient in the sulphur-containing amino acids methionine and cysteine as compared to whey protein (table 1) (2), (4).

Chickpea proteins show good functional properties, such as solubility, water and oil absorption capacity, emulsifying, foaming and gelling properties. In many parts of the world, traditional dishes are composed of chickpeas combined with wheat, rice or other cereal. This combination aids in meeting recommended daily protein requirements and improve the nutritional characteristics of the food. Chickpea, and pulses in general, represent alternative sources of nutritional and functional proteins for individuals suffering from allergic reactions to gluten, eggs, milk, fish, shellfish and/or plant proteins such as sesame, peanut and soybean.

The Protein Digestibility Corrected Amino Acid Score (PDCAAS) measures protein quality based on amino acid content and digestibility. The PDCAAS of chickpea protein is lower than other plant proteins such as soybean and peanut (table 2) (5).

Processing of chickpea for protein concentrates (6)

Chickpea protein can be of three forms: flour, concentrate, and isolate. Usually, isolate contains a higher concentration of protein (80%- 90% protein);

Table 2: PDCAAS of proteins (3)

Protein source	PDCAAS value
Egg powder defatted	1.0
Whole milk powder	0.95
Whey protein concentrate	1.0
Soy protein isolate	0.98
Peanut meal	0.94
Chickpea protein	0.85

as it undergoes additional processing to remove carbohydrates and fats, whereas concentrate (50%- 75% protein) retains fibre and other nutrients. (6)

Chickpeas have a protein content of ~20-25%, and this protein can be extracted using dry and wet fractionation methods and enhanced to produce protein concentrates and isolates. Chickpea protein concentrates are characterized by having a dry weight of at least around 65% protein content.

Selecting the most appropriate approaches for extraction and purification is essential as the choice of approach influences the functional, sensorial and nutritional properties of the concentrates.The chickpea variety used to obtain protein concentrates influences the characteristics of the ingredient; it has been reported that higher soluble protein content for flour and concentrate produced from 'desi' than 'Kabuli' chickpeas.

Dry fractionation involves processes such as dehulling, milling and air classification. De-oiling of the flour is required before the process to obtain maximum protein yield. Air classification is based on separating flour particles based on their size and density, where air is fed into a classifier chamber, which causes centrifugal and gravitational forces to separate the light, fine fraction (typically protein) from the heavy, coarse fraction (typically starch).

However, the use of dry extraction approaches results in lower protein yield and purity compared with wet extraction approaches. New approaches are currently being investigated to enhance protein yield and purity during dry fractionation extraction; for example, air classification can be followed by a tribo-electrostatic separation step, during which protein and fibre are oppositely charged and thereby separated in an electrostatic field (6).

Wet fractionation, which includes alkaline/acid or salt extraction and an isoelectric precipitation or filtration step, usually leads to high protein concentrations. Such protein concentrates generally, have protein content greater than 70%. Therefore, it is the most commonly used approach for protein extraction. The extraction process has an impact on the antinutritional factors in chickpea protein (table 3). During dry and wet fractionation, the protein concentration in processed flour increases, leading to changes in the content of antinutritional factors. Several antinutritional factors, including polyphenols, phytic acid, condensed tannins, saponins, and trypsin inhibitors, were quantified in legume flours before and after dry and wet fractionation in a study (7) (table 3).

Table 3: Effect of processing for chickpea protein concentrate on antinutritional composition (6)

Anti-nutritional compound	Raw flour	Dry-fractionated protein-enriched fractions	Wet-fractionated protein-enriched fractions
Total polyphenols (mg GAE /per 100 g dry weight)	110.3	260	252.7
Phytic acid (g/100g dry weight)	1.114	2.28	1.914
Condensed tannins (mg/100 g dry weight)	21.5	62.2	62.50
Saponins (mg/100 g dry weight)	807.4	1616.2	1661.6
Trypsin inhibitors (TUI/mg dry weight)	0.29	0.97	1.3

The concentration of total polyphenols and phytic acid was lower in wet fractionated protein concentrates while concentration of trypsin inhibitors was slightly increased.

The saponins and condensed tannins concentrations were similar in protein concentrates obtained by both processes. Dry fractionation resulted in improvement in PDCAAS of chickpea concentrate by 5%.

Enzymatic hydrolysis with trypsin improved the protein quality,(by reducing trypsin inhibitor concentration), solubility, and oil holding capacity of chickpea isolate. (7)

Applications of chickpea protein ingredient (8)

Incorporation of chickpea protein ingredients in cereal-based food products improves protein content and quality, along with enhancing nutritional value and some organoleptic characteristics of food products.

Partial substitution of wheat flour with chickpea flour improves the protein content and nutritional value of food products made therefrom (e.g., pasta, bread and other baked goods) and in some cases can enhance the rheological, functional and sensory properties of these products.

Chickpea flour has been used in the production and formulation of pasta products with low glycaemic index. Chickpea protein concentrate was used in the improvement of organoleptic properties of “Merguez” sausage with chickpea protein concentrate added at 1.5, 2.5 or 5% protein into cooked sausages.

The results suggested that addition of chickpea protein concentrates in meat products provides satisfactory organoleptic characteristics, reduces the level of lipid oxidation, improves the stability of colour during storage and provides antioxidant properties. Chickpea protein concentrates are suggested as alternatives to soy for sausage-type meat analogues, due to good gelling properties, in addition to good emulsifying and foam stability of the protein.

Summary

Chickpea serves as a key pulse protein source and is an important component of the food ingredient industry. Traditionally chickpea a versatile ingredient has been used in India in various food products. Processing chickpeas into protein concentrates and isolates provides an alternative plant-based protein to whey protein.

References:

1. Zhang et al. (2024), Plants, 13, 429. https://doi.org/10.3390/plants13030429

2. Indian Food Composition Tables,(2017), https://www.nin.res.in/ebooks/IFCT2017.pdf

3. Bulbula et.al., (2018), Cogent Food & Agriculture, 4 (1), 1422370, https://www.tandfonline.com/doi/full/10.1080/23311932.2017.1422370#abstract

4. Cassiday L., (2018), INFORM (Int. News on Fats, Oils, and Related Materials), April 2018, Vol. 29 (4), 6-16

5. Gorissen et.al (2018), AminoAcids, 50:1685–1695, https://doi.org/10.1007/s00726-018-2640-5

6. Yeasmen N., and Orsat V., (2024), Crop Science. 2025;65:e21361, https://doi.org/10.1002/csc2.21361

7. Han et. al., (2025), Curr Res Food Sci. 2025 Jul 22;11:101152. https://pmc.ncbi.nlm.nih.gov/articles/PMC12336703/

8. Grasso et.al., (2022), Compr Rev Food Sci Food Safety, 21(1):435-452. https://doi.org/10.1111/1541-4337.12878

REGULATORY ISSUES IN EXPORTING FOOD PRODUCTS

AUTHORS

Ms Meenu Yadav,
Principal Manager,
Regulatory Affairs

& Ms Reshma Poothatta,
Associate Manager,
Regulatory Affairs

Marico India

India has transformed from food-deficit to food-surplus, becoming a major exporter of fresh and processed products. With diverse agro-climatic conditions and government reforms promoting exports, sustainable agriculture, and organic farming, India is poised to be a leading global food producer.

A large share of exports go to the U.S., Europe, and Southeast Asia, but stringent food safety regulations remain the biggest hurdle. Non-compliance can lead to rejected consignments, financial losses, and reputational damage. Exporters must therefore navigate complex international standards, certifications (e.g., Organic, HACCP, GMP, Halal, ISO), and compliance requirements to succeed. (Awasthi, N. P., Singh, S. K., & Yadav, P. K. S. 2025)

Stricter Regulations

Food safety has become a pressing global issue due to growing health concerns. Contaminants can infiltrate the food supply chain, from agricultural production to processing and final consumption. Factors, such as poor inputs, microbial contamination, and fraud affecting trade. To address this, strict regulations have been introduced, but these measures can also create barriers in international markets.

The EU enforces strict limits on pesticides, contaminants, and additives, often tougher than exporting countries. The U.S. FDA's Food Safety Modernization Act (FSMA) emphasizes preventive controls and traceability. Such rules act as non-tariff barriers, making entry difficult even with low tariffs. While the Codex Alimentarius offers global guidelines, nations often add extra standards, creating a complex patchwork for exporters.

BEE PHARMO LABS PVT.LTD
THE PLEDGE OF ACCURACY
SINCE 1988

OUR ACCREDITATIONS

FOOD PRODUCT TESTING SERVICES

We are Govt approved testing laboratories by **FDA**
Our test facilities are accredited by **NABL[ISO/IEC 17025:2017] & ISO certified(9001:2015)** by **EURO VERITAS**
Our lab has been approved by **FSSAI, BIS, APEDA**

We Can Undertake Following Food Categories for Analysis

Products

- Dairy products
- Fruits, vegitables and its products
- Cereals, pulses and its products
- Spices, Condiments and its products
- Animal origin, fishery and its products
- Alcoholic and non alcoholic products
- Oil seed, oils and its produts
- Sweets.,confectionary and its products
- Bakery products
- Sugar, Honey & jaggery
- Process, canned food products
- Feeds
- Water
- Ready to eat
- Infant substitute
- Skim Milk Powder

Testing as per FSSAI requirements.

- Pesticide residues, PAH, PCB's
- Mycotoxins
- Natually occurring toxins(NOT,s)
- Heavy metals and minerals
- Minerals & Toxic heavy metals
- Vitamins
- Antibiotics / Residues
- Food Adulteration tests
- Food additives, preservetives and artificial sweetners
- Synthetic food colour
- Antioxidents
- Packaged Drinking analysis as per IS 14543
- Drinking water as per IS 10500
- Process water IS 4251
- Shelf life study(Ambient @ Acclerated)
- Microbiological testing (Bacterial and pathogens)
- Hygiene audit /Kitchen audit
- Allergens
- Sterol Composition

Analytical Facility

1) GC MS MS
2) LC MS MS
3) ICP MS
4) AAS/ GF/ Flame
5) HPLC with UV/ FLD/ RI/ PDA
6) HS with GC FID/ TCD
7) Ion Chromatography with CD
8) Protein / Fat / Fibre Analyzer
9) Elisa Reader
10) FT-IR
11) U V Spectrophotometer
12) Partical size by Malvern (Wet & Dry)

Bee Pharmo Labs Pvt.Ltd
C-2, Hatkesh Udyog Nagar, Mira Bhayander Road, Mira Road (East), Thane - 401107
Tel: 9029774868 to 9029774877 (10 Lines)
info@beepharmo.com | food@beepharmo.com | www.beepharmo.com

Understanding Diverse Regulatory Frameworks

Exporting food products requires navigating varied regulations across countries. What is allowed in one market may be banned in another—for instance, preservatives permitted in the U.S. are prohibited in the EU. Labelling rules also differ, covering nutrition facts, allergens, and origin details. Errors can cause shipment rejections, financial loss, and reputational harm. Exporters must therefore invest in regulatory expertise to ensure compliance. (Awasthi, N. P., Singh, S. K., & Yadav, P. K. S. 2025)

Exporting from India to the USA, Canada, and the EU involves complex, evolving regulatory landscapes. As of April 2026, challenges are categorized by region and common hurdles.

Country specific requirements

1. United States: FDA & FSMA Compliance

The U.S. market is heavily governed by the Food Safety Modernization Act (FSMA), which shifts the focus from responding to contamination to preventing it.

- FSMA Rule 204 (Traceability): Compliance deadline extended to July 20, 2028, but exporters of listed foods (e.g., nut butters, seafood, produce, cheeses) must already digitize supply chains and provide Key Data Elements (KDEs).
- Foreign Supplier Verification Program (FSVP): U.S. importers must verify Indian suppliers meet safety standards; lack of documentation leads to border refusal.
- Import Alerts & Detentions: Frequent FDA "Red List" alerts target Indian products for Salmonella (spices, botanicals) and unapproved additives (e.g., lead chromate in turmeric, unauthorized colors in snacks).

2. Canada: CFIA & Health Canada Standards

Canada has unique technical requirements that often differ from both the U.S. and Indian standards.

- Bilingual Labeling: All mandatory details must appear in English and French; in Quebec, French must be equally prominent.
- Front-of-Pack Nutrition Labeling: From Jan 1, 2026, foods high in sodium, sugar, or saturated fat must display a magnifying glass symbol on the front.
- Safe Food for Canadians Regulations (SFCR): Exporters must support importers' Preventive Control Plans with detailed documentation on processes, hazards, and sanitation.

3. European Union: Stringent Pesticide & Environmental Laws

The EU is currently the most challenging market due to its "precautionary principle" and extremely low tolerance for residues.

- Residue Limits: Near-zero tolerance for Ethylene Oxide in spices/sesame; new pesticide MRLs (Regulation 2026/215) from Aug 2026 will further tighten limits on substances like ethephon and propamocarb.
- Deforestation Regulation (EUDR): By Dec 30, 2026, exporters of coffee, cocoa, or soy must prove products weren't grown on deforested land after 2020.
- Audits: EU plans a 50% increase in audits of Indian agricultural exports in 2026, focusing on pesticide residues and animal welfare.

4. Middle East (GCC & Egypt)

The Middle East is moving toward aggressive digital oversight and fiscal policies to combat lifestyle-related health issues.

- Front-of-Pack Labeling (FOPL): *Abu Dhabi:* Mandatory "Nutri-Mark" grading (A–E) for dairy, oils, and children's food.

Saudi Arabia: Saltshaker icons for high-sodium items and caffeine disclosure required since 2026.

- Sugar Tax Reform: From Jan 1, 2026, Saudi Arabia and UAE apply volumetric excise taxes; drinks with >8g sugar/100ml face the highest bracket.
- Sustainability Rules: UAE bans single-use plastic cutlery/containers from Jan 1, 2026; alternatives must be PFAS-free and certified.
- Digital Compliance: UAE and Oman mandate Digital Product Passports or QR codes for traceability and certification links.
- Translation Barrier: Most of the GCC standards are often published only in Arabic, making accurate English translations difficult to obtain.

5. Southeast Asia (ASEAN)

The region is transitioning from voluntary standards to strict, harmonized, and health-centric regulations.

- Indonesia's Hard Deadlines:
  Mandatory Halal certification by Oct 17, 2026.
  Nutri-Level labeling (A–D) from Apr 2026; Grade D faces ad restrictions.
- Vietnam: Decree 46/2026 requires re-registration of all imports within 12 months; high-risk groups (dairy, supplements) need HACCP/GMP certification by year-end.
- Thailand: Expanding tiered Sodium Tax on processed snacks and canned goods, pushing reformulation.
- Philippines: New framework for Food-Contact Articles; packaging must carry "Certificates of Suitability" proving no chemical migration, especially in recycled plastics.

6. Australia & New Zealand (FSANZ)

Regulatory focus is currently centered on allergen transparency and biosecurity enforcement.

- Allergen Labeling (PEAL): Transition ends Feb 25, 2026; non-compliant labels (missing bolding or "Contains" summaries) banned.
- Health Star Rating (HSR): Moving from voluntary to mandatory in 2026/27; exporters should add ratings to front-of-pack now.
- Ingredient Restrictions:
  Caffeine: Pure caffeine sales restricted; high-caffeine drinks need warning labels.
  PFAS: Total ban in fiber-based food packaging enforced at borders.
- Biosecurity: Zero tolerance for documentation errors; new government certificates required for high-risk imports (e.g., salmon roe, molluscs) from mid-2026.
- Other Certifications: Beyond safety and labeling, exporters must also meet certifications like Organic, HACCP, GMP, Halal, and ISO standards, which are increasingly demanded by importing countries.

Harmonization of Labels Across Countries

Beyond facility registration, exporters struggle to harmonize food labels across jurisdictions. The U.S. requires compliance with Nutrition Labelling and FALCPA, mandating nutrition panels, allergen declarations, and ingredient lists. These differ from EU, Canadian, and Asian rules, creating a complex landscape. Within the U.S., requirements are fragmented across FDA, USDA, and state levels, meaning a product compliant in one jurisdiction may be rejected in another. This fragmentation drives up costs for exporters, who must adapt packaging, hire consultants, and conduct repeated testing.

Food frauds and future prospects to prevent food frauds by analytical techniques food frauds

Food fraud involves intentional adulteration or misrepresentation, such as product substitution,

unapproved additives, false origin claims, misbranding, counterfeiting, stolen shipments, or deliberate contamination. It typically arises where controls are weak and detection is unlikely, creating economic losses and health risks. Common types include substitution, mislabeling, and use of banned substances. (Awasthi, N. P., Singh, S. K., & Yadav, P. K. S. 2025)

Case Studies of Regulatory Challenges

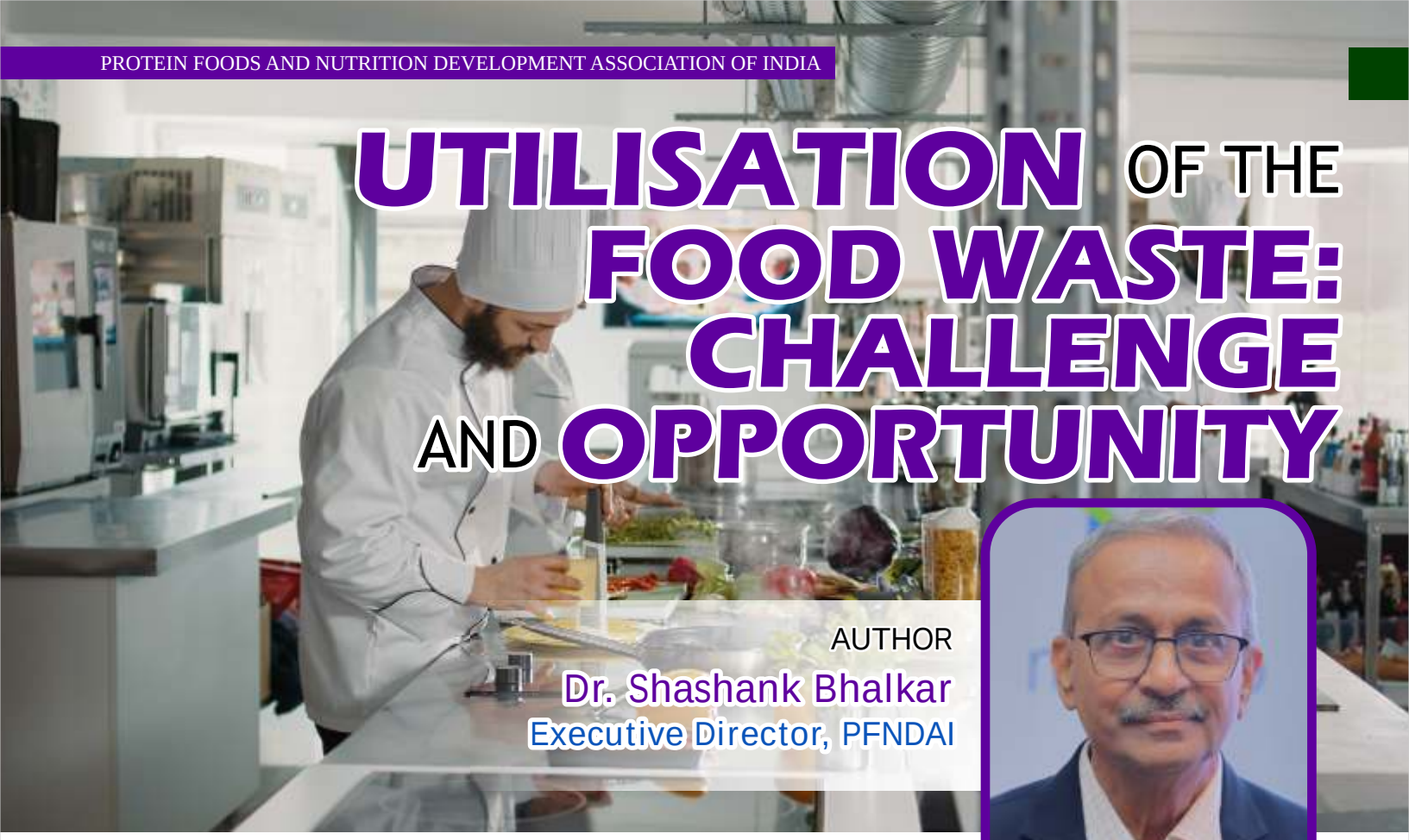
Several recent incidents highlight the importance of regulatory compliance. Indian spice exports faced scrutiny in the European Union due to ethylene oxide contamination, leading to stricter monitoring and testing requirements. Similarly, Asian fish exports were banned in certain markets after formaldehyde residues were detected, underscoring the need for chemical safety compliance. The melamine contamination scandal in Chinese milk products demonstrated how lapses in regulation can have devastating consequences, not only for consumers but also for the credibility of an entire industry. (Awasthi, N. P., Singh, S. K., & Yadav, P. K. S. 2025).

Conclusion

Exporting food products offers immense opportunities for economic growth and global integration, but it is inseparable from the responsibility of ensuring food safety. Stricter regulations, diverse frameworks, and complex certification requirements pose challenges that exporters must overcome through investment in infrastructure, testing, and regulatory expertise. Ultimately, compliance is not just about gaining market access; it is about safeguarding consumer health and building trust in global food supply chains. As international trade continues to expand, exporters who prioritize regulatory adherence will be best positioned to thrive in competitive markets.

Reference

- Awasthi, N. P., Singh, S. K., & Yadav, P. K. S. (2025). Technical challenges and opportunities in export of food from India: Food regulatory compliance and future prospects to prevent food frauds using analytical techniques. International Advanced Research Journal in Science, Engineering and Technology, 12(7).
- Flanders Investment & Trade. (2023). Food labelling requirements in the United States. Brussels: Government of Flanders, Flanders Investment & Trade Agency.
- Electronic Code of Federal Regulations. (2026). 21 CFR Part 1 Subpart H — Registration of Food Facilities.



UTILISATION OF THE FOOD WASTE: CHALLENGE AND OPPORTUNITY

AUTHOR
Dr. Shashank Bhalkar
Executive Director, PFNDAI

Food waste is a global challenge because of its severe impact on climate change. Approximately 1.3 billion tons of food is wasted annually, equivalent to 30% of the total food produced for human consumption and to 8 – 10% of Greenhouse Gas (GHG) Emissions. Food protein waste is a major contributor to the situation.

Animal protein production accounts for major GHG emissions and 30% of biodiversity loss. Plant protein production has severe and immediate consequences for the nitrogen and phosphorus cycles, as well as for biodiversity loss due to deforestation. Therefore, the production of both animal and plant protein foods affects planetary boundary systems. There is a need for greater food production due to the rising global population, which will lead to increased food waste and greater environmental damage. We cannot afford to treat food waste as an end product in a linear economy; it must be efficiently valorised in the circular economy through various means. The waste can be used to extract proteins, which can be used for animal feed or directly for food for humans. The extracted protein can be used for other applications, such as producing biodegradable plastics or purifying water. It can be utilised to produce Single Cell Protein that will be used as Food or Feed. Diverse efforts have been made to utilise Food waste.

Utilisation of waste to valuable products: (1) There are efforts to utilise the processing waste by the food industry. Every food processing industry produces waste after extracting the desired part. The first approach is to create a valuable product by using this waste. In the animal food industry, whey, collagen, and keratin are the main sources of industrial waste proteins.

Liquid whey has been reprocessed into food for human consumption, such as whey protein isolates. Because of its high-quality protein, whey protein is incorporated into many food products. Collagen is mainly extracted, purified, and processed into hydrolysed type I and II collagen and used as a nutraceutical ingredient.

The hydrolysed/degraded form of collagen, gelatine, is also used in food products. In the fishing and seafood industry, interest exists in collagen-rich waste from fish skin, bones, and scales. One notable example of reusing leftover fish parts is fermenting them into fish sauce, which is widely used in Asian and European cuisines.

Additionally, nutritious fish oil, rich in polyunsaturated fatty acids, is extracted for human consumption, leaving residual fishmeal that is protein-rich, has a balanced amino acid profile, and is good to digest. Recently, oilseed and cereals have been explored for protein extraction and use in food.

Soybean meal is processed to produce soy protein isolates (SPI), which are commonly used in human consumption.

Furthermore, soy protein isolates exhibit good emulsifying, water-adsorption, and textural properties, and are widely used as food additives, confectionery, pastry-making, beverages, and alternative meats. Soy proteins are allergenic, whereas oilseed proteins are non-allergenic and can serve as alternatives to soy proteins. However, the hurdle is removing anti-nutritional factors.

Zein protein is extracted from the corn gluten, a byproduct of corn processing. It is not suitable for consumption because of a lack of essential amino acids. Enzymatic and chemical modification of Zein can improve its functional properties and be used as a network-forming additive in meat analogues.

Wheat gluten, a byproduct of flour milling, has many food applications. Gluten hydrolysate can be a flavour enhancer. Rice bran has 10 – 16% proteins and is rich in bioactive compounds, which, when incorporated, enhance the nutritional value of bakery goods. Rice protein concentrates with good functional properties can be used in beverages and coffee whiteners. Reutilisation of food waste into food products needs an assessment of safety and nutritional quality before use.

Food Waste to Single-Cell Protein (SCP): (2)

Converting Food Waste into Single-Cell proteins is a novel approach to produce protein-rich feeds. SCPs are high in protein content (30 – 70%), low in fat, require less water and have a low carbon footprint. SCPs are protein-rich biomass produced through fermentation and are produced by a wide array of microorganisms, including bacteria, yeasts, fungi and microalgae.

Food Waste generated by agricultural, industrial, food retail, and municipal sectors is an optimal substrate for the cultivation of different microbial cells. It has a moisture of 74 – 90%, a carbon to nitrogen ratio of 14.7 – 36.4. It contains vast amounts of micro-nutrients like iron, magnesium, manganese, copper, zinc, vitamin B6, vitamin C, vitamin K, selenium, etc. and macronutrients such as fibre. Fruit and vegetable wastes are more suitable for the SCP because of their high content of monomeric sugars and low lignin content.

MODERN DAIRIES®
taste happiness™

NutriLac®
NUTRITIONAL INGREDIENTS

A WORLD OF NUTRITION & WELLNESS

CASEIN | WHEY PROTEIN CONCENTRATES | LACTOSE






Modern Dairies is a leading dairy manufacturing company since 1993. The plant facilities are state-of-the-art and the company has a strong technical background, operated by a highly competent and motivated team of professionals.

Modern Dairies has one of the largest facilities for Casein, Whey Proteins and Lactose - Pharma Grade. The Company's Quality Management System has been certified by DNVGL Netherlands for updated version of ISO 9001, FSSC 22000 and ISO 14001. The facilities are approved and registered with USFDA, Export Inspection Agency & APEDA for supply of its products in the international market. NutriLac Pharma Grade Lactose confirms to the international standards of USP, BP & IP.

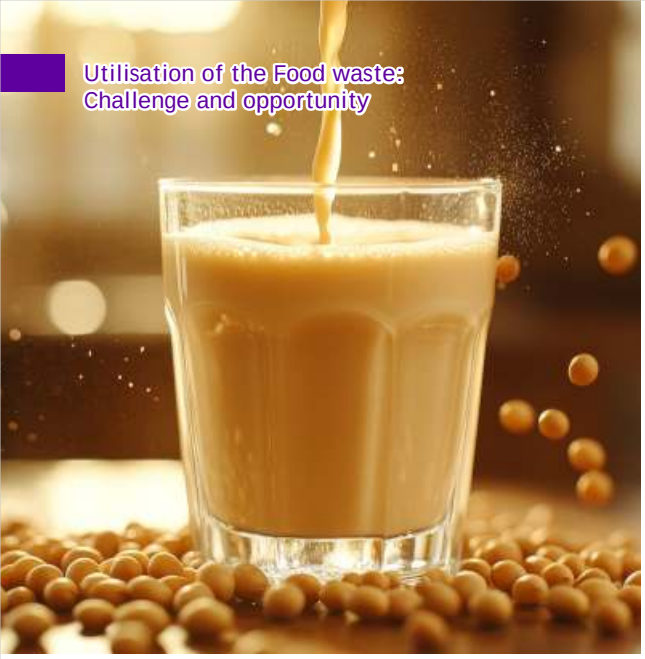
A Snapshot of our Customers

Abbott A Promise for Life
CADILA PHARMACEUTICALS LIMITED
Amway
Zydus Wellness
FDC Limited
Raptakos, Brett & Co. Ltd.
Coca-Cola
Hindustan Unilever Limited
BRITANNIA Eat Healthy. Think Better
Pizza Hut
Domino's Pizza
WRIGLEY A Subsidiary of Mars, Incorporated

Disclaimer: All product names, logos and brands are property of their respective owners. All company, product and service names are for identification purposes only. Use of these names, logos and brands does not imply endorsement.

MODERN DAIRIES LIMITED
Corporate Office : #98-99, Sub-City Centre, Sector 34, Chandigarh - INDIA
Works : 136 KM, G.T. Road, Karnal - Haryana
www.moderndairies.com | Email : info@moderndairies.com

®: Registered Trade Mark, TM: Trade Mark, Owners: Modern Dairies Ltd.



SCP-producing microbes: Biosynthesis of SCPs is done by Bacteria, microalgae, fungi, and yeasts. Bacteria can assimilate a broad range of carbon sources, including Food Waste. The bacterial SCP is reported on lab and pilot scale with a high protein yield of 50 – 80%. Recovery of bacteria is difficult because of their smaller size as compared to yeast and fungi. High nucleic acids produced by bacteria make them harmful to humans.

To create a maximum value chain, bacteria are explored to produce high-value compounds such as biopolymers, biofertilizers, biosurfactants, biolipids, biofuels, etc. Fungi have been exploited to produce SCPs because of their robustness, high yield, and high density. Fungal-derived SCPs offer health benefits as it has micronutrients such as Vitamin B12, riboflavin, zinc, phosphorus, and manganese.

Fungi secrete large amounts of hydrolytic enzymes, which play a role in the biodegradation of the waste. Fusarium venenatum, Aspergillus niger, Trichoderma sp are attracting a lot of scientific and industrial attention because they generate high SCP yields from 30 – 70% with low nucleic acid (7 – 10%) that need to be processed.

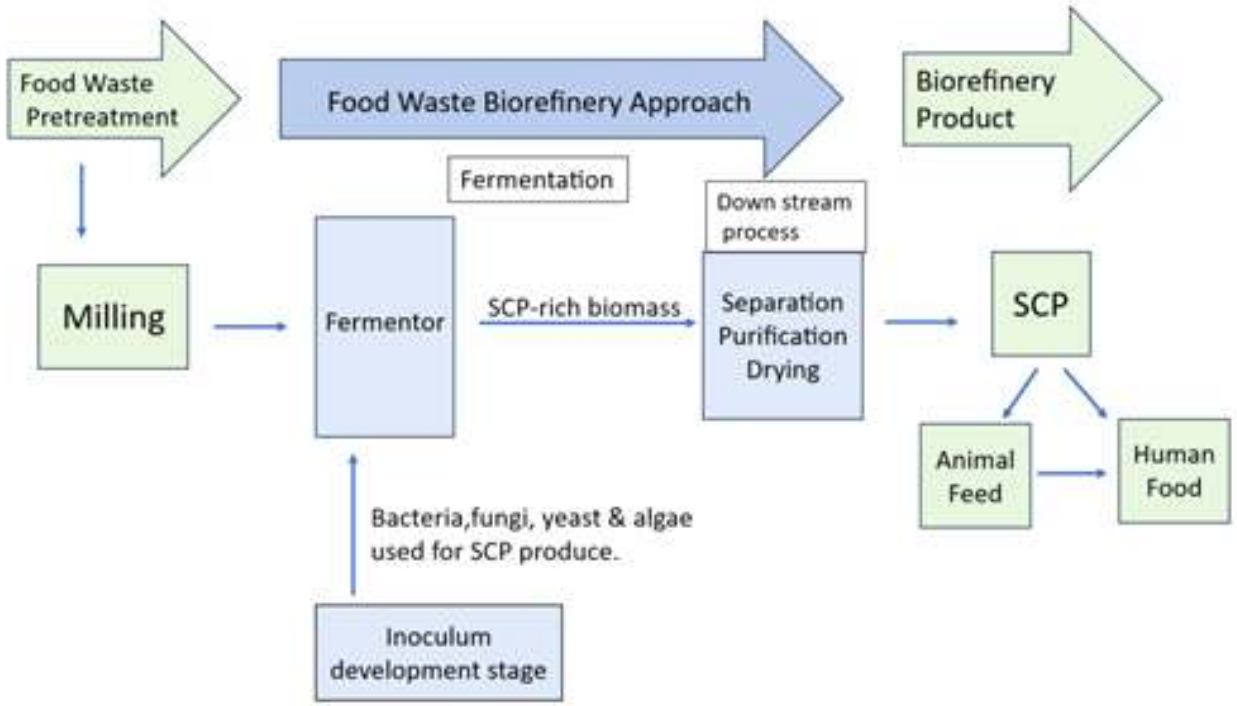
Wastewaters produced by fruit processing, cheese processing, potato processing, wheat processing, and the brewing industry can be treated by fungi to produce large-scale SCPs and hence support the circular economy. A new bio-based market is being created by a fungal-based biorefinery strategy.

Aspergillus niger produces citric acid and gluconic acid on an industrial scale. Rhizopus spp produce lactic acid. Mortierella wolfii and Aspergillus terreus can produce fatty acids when grown on culture media containing food waste. Microalgae can produce a high yield of protein (60 - 70%) with other essential nutrients (Omega 3, Omega 6, vitamins A, B, C, E, minerals, etc.). Presently, many microalgae are added to food formulations, enhancing their value chain. Spirulina is sold as a protein-rich supplement. Chlorella and Scenedesmus are used in wastewater treatment. Senedesmus produces SCP (43.1%) that has amino acid content similar to soybeans.

It also produces biochemicals and biofuels, promoting a circular economy. Yeasts are used for SCP studies because of their metabolic robustness, superior nutritional yields, and can assimilate diverse carbon sources, including food waste. Many yeasts, such as Saccharomyces cerevisiae, Candida utilis, Cryptococcus curvatus, Kodamaea ohmeri, etc., are widely used to embrace the concept of “waste-to protein” because of high protein yields (30 -70%), and the ability to grow on waste.

They are being explored to use a yeast-based biorefinery. Yeast cells do not need to be lysed in comparison to algae. A conceptualised illustration of the SCP process from food waste is given in Figure 1.

Figure 1: SCP process from food waste



Modes of fermentation for SCP production:

Fermentation can be carried out by various methods. Submerged fermentation is conducted in a bioreactor and can be operated in batch, semi-batch, or continuous modes. The fractionated substrate is immersed in the liquid nutrient medium to obtain protein-rich biomass. The SCP is recovered through filtration or centrifugation of the biomass. Semisolid fermentation may not be suitable for SCP production. This requires higher operational costs due to the need for advanced biomass fractionation methods. Solid-state fermentation used in SCP production has given desirable outputs. It uses little energy and water and produces less wastewater.

Food Waste to Bioplastics:

(1) Plastics have brought enormous benefits because of their low cost, lightweight, high performance, and durability. However, major plastics are produced using petrochemicals; less than 9% is recycled, and disposal is by incineration or landfilling, where it remains for thousands of years. This is becoming an environmental burden that contributes to climate change. The latest research has shown that proteins are one of the biopolymers for developing bioplastics, which are sustainable, biodegradable, and compostable.

Protein-rich food byproducts can be processed into bioplastics by using techniques such as solvent casting followed by evaporation, injection moulding, extrusion and 3D printing. Unprocessed liquid whey via microbial fermentation can be converted into a biopolyester. Whey protein isolate can be converted into transparent, colourless, and edible bioplastic film. Blending whey proteins with other natural polymers, such as polysaccharides, improves the thermoplastic properties of whey proteins. There are some disadvantages to using whey protein. The exact composition of whey depends on several other

parameters, making it challenging to produce films with reproducible properties.

Sweet and acid whey are extremely diluted in wastewater and difficult to transport or store unless concentrated. Fish and animal food waste rich in collagen can be converted into transparent, flexible, and edible films with good mechanical properties. Keratinous material from chicken feathers or sheep wool, rich in cysteine, because of cross-linking, can form bioplastic resistant to water, weak acids, and organic solvents. Soy protein isolates could be successfully transformed into bioplastics with good mechanical properties. Other ingredients, like polysaccharides or lipids, when added, can improve the mechanical properties.

Some studies have indicated the use of soy whey and okara with minimum treatment to produce edible films, functional films, edible coatings, or films for packaging. Canola/ rapeseed cake can be valorised with a minimum treatment into various biodegradable materials, edible films, and films for packaging applications. Zein films formed by solvent casting from ethanol solution are insoluble in water, grease-resistant, and highly hydrophobic. But they are brittle. Gluten from corn and wheat has also been intensively studied for film-forming properties via solvent casting or thermoplastic processing for various bioplastics, including edible films and coatings, packaging, and fibres.

Food waste for water purification: Typical water purification technologies are energy-intensive and make use of unsustainable synthetic materials. Proteins can be used for water purification because of their functionality and adsorption affinity towards a wide range of contaminants in the wastewater. They possess a strong affinity to heavy metals due to the chemical coordination between metal ions and amino acids on the protein surface. Pure proteins such as zein and gluten have shown strong potential for water purification applications. In such applications, there is a need to hybridise the protein with other materials to form absorbents. Yet, there are reports on applications of using food waste and byproducts containing proteins directly for water purification.

For example, functionalised soy waste biomass after oil extraction was used to remove Pb, Cu, and Ni. Okara has been widely used for water purification from dyes, heavy metals, and phosphorus. Soybean residue from bean curd or soymilk production has been hybridised with polyacrylic acid to remove heavy metals. In another report, four keratin fibres: human hair, dog hair, chicken feather and degreased wool were used directly as absorbents for the simultaneous removal of eight cations (Cr, Mn, Co, Ni, Cu, Zn, Cd, and Pb). The removal performance efficiency was in the order: degreased wool > chicken feathers > human hair > dog hair. Wool keratin has more sites for disulfide bonds and a higher molecular weight than feather keratin, making it better. Other compounds, like polysaccharides in the waste, might have also contributed to water purification. The difference in purification performance between pure proteins and waste may indicate that protein-binding sites in waste are inaccessible to water pollutants. Keratin feathers form 91% of the poultry industry. However, fabricating keratin films and membrane absorbents is challenging because of their weak mechanical properties.

Extraction technologies used for the extraction of proteins from the food waste:(3)

Food waste Proteins coexist with complex constituents like pectin, cellulose, starch, and often lipids in the cells and extraction yields are lower. Many novel methods of extraction are being explored to meet the challenge.

The methods include enzyme-assisted extraction. Efforts are also based on physical methods, such as Cavitation methods, including the use of ultrasonics or high pressure, microwave, pulsed electric field, supercritical extraction etc. All the extraction technologies are at an experimental stage and are mostly batch processes.

Conclusion: Approximately one-third of the food produced globally is wasted or lost, and it has been reported that this food loss accounts for 8-10% of total GHG emissions. Reducing the amount of food waste through increased production efficiencies and reintroducing part of the food waste back into the food supply chain would make it possible to satisfy global food demands while reducing net food production and its carbon footprint. Food waste is used to make Single Cell Proteins that can be used in food and feed to help reduce GHG.

Conversion of food protein waste into bioplastics will have the additional benefit of reducing the environmental impact caused by conventional plastics disposal. Increasing

Food waste is a challenge to the environment. This challenge can be converted into an opportunity by the combined efforts of the government, industry and research.

References:

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

2) https://www.mdpi.com/2076-2607/12/1/166

3) https://ift.onlinelibrary.wiley.com/doi/10.1111/1541-4337.12739

EMERGING SUSTAINABLE SOURCES OF OMEGA-3 FATTY ACIDS:

AUTHOR
Prof Jagadish Pai,
Editor, PFNDAI

There are many health benefits of omega-3 fatty acids(omega 3s). They reduce the risk factors of heart diseases by reducing triglycerides, by raising HDL and reducing LDL cholesterol, and reducing inflammation. Studies suggest that they reduce risk of prostate, breast and colon cancer. They have many benefits for mental health.

Consumption of omega 3s likely to have less depression and anxiety. They have shown to be crucial for brain growth & development in infants. They reduce symptoms of ADHD in children. Omega 3 supplements have also shown improvement in schizophrenia and bipolar disorder. They help prevent age-related mental decline and Alzheimer's disease. Among some of the other benefits are eye health, metabolic syndrome, and asthma in children. Therefore, there are many advantages of having omega-3s in the diet. (1, 2)

The global market for omega 3 fatty acids was 2.10 billion USD in 2020, and with an annual growth rate of about 7 to 8%, it will reach around 3.6 billion USD in 2028. (3)

Omega 3s are not all considered essential fatty acids, because alpha-linolenic acid (ALA) can be converted to eicosapentaenoic acid (EPA) and docosahexaenoic acid (DHA) in our body, so only ALA is considered essential. Although all the omega-3s provide health, the EPA and DHA provide the most physiological benefits described above. Even though ALA may be less beneficial directly, it also provides health benefits indirectly, as all animals can convert ALA to EPA and DHA, which result in health benefits. (4). However, the rate of conversion of ALA in humans to EPA and DHA is very low, roughly between 5% and 8%. This suggests that humans should consume EPA and DHA sources through the diet and not rely solely on dietary ALA.

Veg DHA Omega-3 Throughout the Life Cycle

life's DHA™ – Veg DHA Omega-3

Health and wellness throughout life

***life's* DHA™ Supports:**

- A healthy pregnancy in mothers to be
- Brain and eye development for foetuses, infants and children
- Cardiovascular health in adults
- Mental health in senior citizens

Also from Vasta:

Lactoferrin for ID/IDA, healthy pregnancy and for immune health;
Nucleotides for infant nutrition; **Phosphatidylserine** for cognition; **Pro/Postbiotics** for targeted digestive & other benefits;
SoyLife manages hormonal imbalance/menopausal complaints; **FenuLife** antacid, reduces GERD; **AB Fortis** highly bioavailable tasteless iron;
Nisin & Natamycin for shelf life extension; … and many other ingredients!

All 100% Natural

VASTA BIOTECH

Vasta Biotech Pvt. Ltd.

M: +91 98416 03903
T: +91 44 24993095 • F: +91 44 24991007
vasta@vastabiotech.com • www.vastabiotech.com

The sources of EPA and DHA are marine fish, seafood, and marine algae, whereas ALA is available from many plant sources, especially seed oils. Thus, vegetarians and vegans, as well as those who do not consume fish and other seafoods, may have difficulty getting enough of EPA and DHA. (5)

Thus, omega-3s are essential nutrients that should be present in our diet. We can get ALA from some of the oils, including flaxseed oil, edamame, soybean oil, walnuts, chia seeds, canola oil, etc. However, as said earlier, the conversion from ALA to EPA and DHA is very low, so supplements may be needed. The richest source of these is fish oil. Although some vegetarians do not mind supplements from non-vegetarian sources, some may prefer vegetarian sources. There are now vegetarian omega 3s produced from algae.

Marine algae contain good amounts of omega 3s and fish consume these algae as food and derive the omega 3s from algae, that are then stored in fish oil. Some object to fish and their oils especially the larger fish as they tend to contain mercury. Hence the algal omega 3 preparations would have least problem and would be most acceptable. More recently, algae are now being harvested and produced either in ponds or in fermenters so they can be produced under controlled conditions. (6)

Fish farming can be an alternative to producing raw material for omega 3s, but its scale may not be able to keep up with the demands of the omega 3s in future. As fish derive their omega 3s from marine algae, it would be the logical choice. There are also microbes that can produce oils rich in EPA and DHA. So omega-3 can be green manufactured from marine algae or algae-like microorganisms that would eliminate many of the problems of taste and odour associated with fish. Some common algae and microbes are used for production of DHA (7).

As fish consume microalgae in ocean water, leading to accumulation of microalgae-produced omega 3s in fish body. However, the sustainability of fish oil-based omega 3s is questioned due to overfishing, inconsistency of omega 3 contents and potential contamination in the ocean. Microalgae, both wild-type and engineered, are used for omega 3s although a small fraction compared to fish oil omega 3. However, microalgae farming or fermentation is challenging to produce EPA and DHA at high yields. So there are processes developed of microbial fermentation to produce them. (3)

Currently, major source of omega 3s is fish oil. Marine species including fish, shellfish and algae etc. contain relatively higher content of omega 3s than land animals and plants. Salmon contains 35.5 g omega 3s per 100 g fish oil.

Although marine animals including fish have limited ability to make them, they enrich omega 3s from microalgae through diet. since smaller fish is eaten by larger, the latter accumulates higher levels. Fish oil is the leading source for humans at present especially of EPA and DHA.

However, fish omega 3 have some limitations. Firstly, there is large variation of omega 3 contents in fish depending on type of fish, its diet, part of fish, environmental temperature, season, location etc.

Secondly, water body contamination like mercury & PCBs is observed in various fish. Finally, there are vitamins A and D present along with omega 3s in fish oils that need to be separated. (3).

Other sources include the oils from plants, microalgae, yeast and bacteria. Although plants have limited synthesis pathways for omega 3 fatty acids, especially EPA and DHA, with molecular biotechnology integrating pathways from microalgae, yeast or bacteria to plants overcomes this problem. Several research groups have successfully carried this out.

Indian mustard oil reached 15% EPA and 1.5% DHA of total fatty acids. (8), transgene soybean could accumulate 19.6% EPA and 3.3% DHA (9) and transgenic canola seed contained 10% DHA (10). Plants are also environmentally friendly and cost-effective. However, they grow slowly and need large amounts of land. They also compete as food sources just like fish and seafood. Omega-3 recovery is expensive.

Microalgae offer an alternative source of omega-3s to fish oil. It is non-polluted, sustainable, arable, land-free and fast-growing, as well as it is the original omega 3 producers in marine food chain. They can grow under different conditions of environment. Because of their rapid doubling time, harvesting for omega 3 could be done in 4-6 days turnover. This makes them highly efficient and sustainable. Furthermore, certain heterotrophic species utilise sustainable, renewable carbon sources as substrate, and thrive in dark environment. (11).

This has advantage over light-dependent phototrophic method as it is not dependent on daily light. The heterotrophic condition allows use of fermenters, which offers cost advantages as well as ease of operation as these have been used for microbial fermentative production for long. It allows shorter culture time, increases cell density that simplifies harvesting and purification. (12). The heterotrophic process is currently used for producing DHA by a Global manufacturer. These algal oils contain a substantial 50% composition of EPA/DHA (11).

Use of fungi for omega 3 production offers a distinct advantage. Fungi can grow on different carbon sources making them flexible. Fungi can undergo high-density cell fermentation with higher amounts of omega 3s in single fermenter making it highly economical.

Engineered yeast, Yarrowia lipolyticacan produce EPA with 50% of total lipids (13). However, there are drawbacks of fungi compared to bacteria. Fungi grow slower and produce large amounts of omega 6 as by-products increasing cost of recovery. They need oxygen during fermentation and give relatively lower yields from glucose.

Bacteria present a viable host although they lack a native pathway for omega 3. Molecular biology can engineer them for omega 3 production. They can grow quickly but their accumulation of adequate lipids is difficult leading to low efficiency. Thus, there will be some time before they become commercially attractive.

Finally

Omega 3 fatty acids are being recognised by scientists, health professionals and consumers as having many health benefits. This increased awareness has increased the market globally. The current source, namely the fish oils are going to be inadequate and also less attractive in future for both sustainability and safety reasons.

Microalgae, the source of omega-3 for fish, are being used alternatively currently. Genetic engineering is also being studied for a variety of sources, including plants, microalgae, fungi and bacteria for cost-effective production of omega-3s.

Thus, in future, people will have omega-3 products that are without any fish smell, acceptable to vegans, without any toxic metals or pollutants, and are quite affordable.

References:

1. https://www.healthline.com/nutrition/17-health-benefits-of-omega-3

2. https://ods.od.nih.gov/factsheets/Omega3FattyAcids-HealthProfessional/

3. Qin et al. 2023 https://www.frontiersin.org/journals/microbiology/articles/10.3389/fmicb.2023.1280296/full

4. https://www.healthline.com/nutrition/3-types-of-omega-3

5. https://pmc.ncbi.nlm.nih.gov/articles/PMC6835948/

6. https://my.clevelandclinic.org/health/articles/17290-omega-3-fatty-acids

7. https://pmc.ncbi.nlm.nih.gov/articles/PMC4600955/

8. Wu et al. 2005 https://pubmed.ncbi.nlm.nih.gov/15951804/

9. Chen et al. 2014 https://www.sciencedirect.com/science/article/abs/pii/S1878818113000996

10. MacIntosh et al. 2021 https://pmc.ncbi.nlm.nih.gov/articles/PMC8514783/

11. Lopes da Silva et al. 2019 https://pubmed.ncbi.nlm.nih.gov/31835511/

12. Morales-Sanchez et al. 2013 https://pubmed.ncbi.nlm.nih.gov/23849253/

13. Xie et al. 2015 https://pubmed.ncbi.nlm.nih.gov/25567511/

LABELLING AND CLAIMS FOR HEALTH FOODS

AUTHORS

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

&

Ms Dolly Soni, Marketing & Projects Manager, PFNDAI

Over the last few years, the way in which consumers have started looking at packaged food and fast food has changed dramatically. They are not just a source of energy or indulgence anymore, but are also considered a source of health management and improvement of the quality of life. Thus, the food industry is experiencing a rapidly growing market for healthy foods.

The global healthy foods market size was estimated at USD 1,063.3 billion in 2025 and is projected to reach USD 2,013.0 billion by 2033, growing at a CAGR of 8.1% from 2026 to 2033. The growing awareness of health and nutrition among consumers is one of the most significant drivers of the growth of the healthy foods industry (1).

The current food retail environment is a reflection of the consumer mindset, which has perhaps never been more inquisitive or awakened than it is today. From “protein-rich” food products to “fibre-rich” breakfast cereals and beverages fortified with minerals and vitamins. The current demand for food products is not limited to any specific consumer group. It spans from young working professionals to health-conscious consumers.

Now in this new food environment, phrases such as “rich in protein,” “low-fat,” “rich in fibres,” “rich in antioxidants,” among others, are not merely phrases as they can influence consumer decisions in a matter of seconds. Product labels have become a medium of brand communication as they are the first point of interaction between the consumer and the brand before they make a purchasing decision.

In India, 58% of urban consumers reported prioritizing nutritional benefits over taste when choosing snacks, a figure that exceeds the global average of 52% and reflects a broader trend of informed eating habits, particularly among Millennials and Gen Z, who scrutinize nutritional labels before buying (1).

Understanding Food Claims (3)

According to the FSSAI, a claim refers to any representation, whether written, spoken, or visual, that states, suggests, or implies that a food has specific qualities related to its origin, nutritional properties, composition, or processing. Claims can be classified into health claims and nutrition claims.

Health claims describe the relationship between a food (or a component in it) and health. These are further divided into three types. A nutrient function claim explains the role of a nutrient in normal body functions, growth, and development. For example, stating that calcium supports bone health and that a product is rich in calcium. Other function claim highlights the beneficial effects of a food or its constituents on normal physiological functions, such as fibre supporting digestive health. A disease-risk reduction claim suggests that consuming a food as part of a balanced diet may reduce the risk of a disease. Importantly, such claims refer only to risk reduction and not disease prevention.

Nutrition claims, on the other hand, focus on the nutritional content of a food. A nutrient content claim describes the level of a nutrient present, such as “high in protein” or “low in fat”. A nutrient comparative claim compares the nutrient levels of one product with another, for example, “reduced sugar” or “30% less fat than regular products”. A non-addition claim indicates that a particular ingredient has not been added to the product. Nutrition claims inform consumers about the composition of a food; health claims go a step further by linking the food or its components to specific health benefits. Understanding these distinctions can help make more informed choices and ensure that claims are interpreted correctly.

Another important concept in this context is the “Recommended Dietary Allowances” (RDA). RDA refers to the average daily intake level of a nutrient that is sufficient to meet the requirements of nearly all (97–98%) healthy individuals within a specific life stage and gender group.

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

For regulatory purposes in India, the RDA values prescribed by the Indian Council of Medical Research (ICMR) are followed. In cases where Indian RDA values are not available for a particular nutrient, reference values established by the Codex Alimentarius Commission or the World Health Organization are applied.

Commonly seen claims on food labels-

All of these claims are permitted only when specific regulatory criteria are met.

A product can be labelled as "low sugar" if it contains not more than 5 g of sugars per 100 g (for solids) or 2.5 g per 100 ml (for liquids). For a "sugar-free" claim, the limit is stricter, no more than 0.5 g of sugars per 100 g or 100 ml. These thresholds help ensure that such claims reflect a genuinely reduced sugar content. A "no added sugar" claim can only be made when no sugars or sugar-containing ingredients are added, and where sugars are naturally present, the label must state "CONTAINS NATURALLY OCCURRING SUGARS".

For a food to be considered a "source of protein", it needs to provide at least 10% of the Recommended Dietary Allowance (RDA) per 100 g (solids), 5% per 100 ml (liquids), or per 100 kcal/serving as specified. To claim "high" or "rich in protein," the product must provide at least 20% of the RDA per 100 g (solids), and 10% for liquids, per 100 kcal.

A product can be labelled as a "source of fibre" if it contains at least 3 g of fibre per 100 g (for solids), 1.5 g per 100 ml (for liquids), or 1.5 g per 100 kcal. To claim "high" or "rich in fibre," the product must contain at least 6 g per 100 g (solids), 3 g per 100 ml (liquids), or 3 g per 100 kcal.

Other than these products, probiotics are among those known to promote the growth of beneficial gut bacteria, which contribute to improved digestion, enhanced immunity, and better overall health. For a product to be considered a "source of probiotics," it must contain at least 10^8 colony-forming units (CFU) in the recommended serving size per day. This minimum level is important to ensure that sufficient live microorganisms are present to potentially confer a health benefit(2).

There are defined limits for claims related to energy, nutrients like fat, MUFAs, PUFAs, Vitamins, minerals, etc. Overall, all such claims comply with prescribed regulatory thresholds and remain consistent with the information provided on the label.

Trends in Health Food Marketing

The challenge today is not only to highlight benefits but to do so in a manner that is clear, credible, and meaningful. Some of the major trends that are defining the marketing of healthy foods can be highlighted as follows:
The concept of protein today is not only limited to the domain of sports nutrition; rather, it has gone far beyond that. There are different types of protein available in the market in the form of snacks, dairy alternatives, bakery items, desserts, etc. For consumers, "protein" is associated with "strength," "fullness," and "weight management," making it a compelling marketing term. While consumers may not fully understand nutrition science, they easily connect with benefits like "feeling full," "fit," and "strong." Brands have picked up on this trend to effectively communicate with their audience.

At the same time, the overuse of 'high protein' raises important questions, whether it is actually significant, if it is for everyone, and whether the product is good overall. Hence, it is important for brands to highlight these benefits appropriately and not use 'protein' merely as a quick fix for sales.

There is an increasing demand for food products that provide health benefits. Functional beverages have witnessed an impressive rise in sales due to their ease of consumption and versatility. Whether for immunity, digestion, or relaxation, the key USP is that it fits into busy lifestyles. Marketing for such products focuses on integrating them into daily life. They are positioned not as 'supplements' but as 'drinks,' shifting the focus from "what the product contains" to "what the product does for me."

One of the upcoming and interesting trends is the use of traditional ingredients in modern food and beverages. Herbs and spices that have been a part of our traditional Indian cuisine for centuries are being promoted as key selling points for these products. The marketing opportunity is in storytelling, creating an emotional and intellectual connection with customers by blending traditional knowledge and science.

Social media plays an immense role in shaping food choices. Consumers are increasingly exposed to health trends through influencers, fitness enthusiasts, and short-form content, accelerating both correct and incorrect information.

For marketers, this means adapting to faster and more engaging communication. Packaging, content, and messaging must work together to capture attention. At the same time, brands should avoid blindly following trends. Today's consumers read labels, prefer fewer and recognizable ingredients, and are drawn to claims like "no artificial preservatives," "no added colours," and "natural ingredients." The clean label movement is indicative of the desire for greater transparency. It is no longer sufficient to say the product is healthy; the consumer wants to know the reason behind its health benefits.

Labelling Requirements and Consumer Awareness

A food label is the direct means of communication between a manufacturer and a consumer. It gives all the necessary details about the food product and helps consumers make an informed decision.

As per the Food Safety and Standards (Labelling and Display Regulations) 2020, food labels must provide accurate information to ensure transparency. Key mandatory details include the name of the food, a list of ingredients (in descending order), and nutritional information declared per 100 g/ml or per serving, along with the percentage contribution to the Recommended Dietary Allowance (based on a 2000 kcal diet). Labels must also display vegetarian/non-vegetarian logos, details of food additives, and allergen declarations where applicable.

In addition, information such as the name and complete address of the brand owner (along with "manufactured by" or "packaged by"), FSSAI logo and license number, net quantity, sale price, consumer care details, lot or batch number, and date markings (including date of manufacture and expiry/use-by date) are required.

Effective labelling empowers consumers to make informed dietary decisions by allowing them to compare products, assess nutritional value, and select foods aligned with their health needs and preferences. By presenting clear and accurate information, labels help consumers avoid allergens, manage specific dietary requirements, and make more conscious, health-oriented purchasing choices (2).

Misleading Claims & Ethical Marketing

It is because of the consumer's desire to understand the product better that marketers are moving away from aggressive claim-based marketing to more informative and transparent communication. As the healthy food space becomes increasingly crowded, marketers are finding it challenging to stand out and are using extremely high and even misleading claims to attract attention. It is not enough to merely comply with regulations; marketers must also ensure they communicate the right way with the consumer in mind.

For instance, there might be a tendency to highlight positive aspects. A food product might highlight "high fibre" on the front of the package, while other aspects may not be highlighted in the same manner. Although technically correct, this can create a bias in the perception of the product.

Ethical marketing attempts to resolve this imbalance by taking a holistic view. Being technically right might not be enough; communication must be relevant and not misleading. Claims should help consumers make informed decisions without confusion. Consumers should not have to decode what a claim means to understand a product. Simple and clear communication makes it easier to build trust and reduces misunderstanding.

In the pursuit of differentiation, there may be a temptation to overpromise. However, overpromising can harm brands, especially in today's world, where consumers have access to information and reviews. Trust is one of the most important aspects in the health food category and is difficult to regain once lost.

With regard to food choices and health beliefs, marketing is a significant force, but one that must be used rationally. Relationship building will succeed for brands committed to consumer well-being along with their business.

To ensure that all claims made on food products are truthful, scientifically valid, and not misleading, the Food Safety and Standards Authority of India regulates food claims under the Food Safety and Standards (Advertising and Claims) Regulations, 2018.

Some general principles laid down by the authority are that all claims must be truthful, unambiguous, meaningful, and not misleading. They should not encourage excess consumption or imply that a balanced diet cannot provide adequate nutrients. Where a claim depends on preparation, the method must be stated along with the number of servings required for the claimed benefit.Claims must be scientifically substantiated using validated methods.

Misleading brand descriptors such as “natural”, “pure”, or “fresh” require a disclaimer stating that the term is only a brand name and does not represent the true nature of the product. Disclaimers must be clear and legible.

Further, the FSSAI logo and license number cannot be used for promotional purposes. Advertisements must not be deceptive, undermine healthy lifestyles, or present foods as meal replacements unless specifically permitted. Claims made in advertisements must be consistent with label information (3).

Conclusion

In a category driven by claims, labels, and perceptions, marketing is not just a tool to seek attention, but a tool that needs to be used in a manner which helps consumers make informed decisions. The challenge, therefore, is to ensure that not only is the communication compelling, but also credible and clear. The industry will continue to change, and so will those brands that are committed to long-term relationship building, as ultimately, health is not just a claim on a package, but a promise to a consumer.

References-

1. https://www.grandviewresearch.com/industry-analysis/healthy-foods-market-report#:~:text=The%20global%20healthy%20foods%20market,the%20healthy%20foods%20industry's%20growth.

2. Food Safety and Standards (Labelling and Display) Regulations, 2020 https://fssai.gov.in/upload/uploadfiles/files/Comp_Labelling%20Display_Version%20VIII_09_09_2025.pdf

3. Food Safety and Standards (Advertising and Claims) Regulation, 2018 https://fssai.gov.in/upload/uploadfiles/files/Compendium_Advertising_Claims_Regulations_14_12_2022.pdf

FOOD FORTIFICATION IN INDIA: STANDARDS AND PERSPECTIVES

AUTHOR
Ms Simran Vichare,
Nutritionist, PFNDAI

Food fortification has become a key nutrition strategy in countries like India, where micronutrient deficiencies exist.

It helps close nutrient gaps. To combat widespread micronutrient deficiencies, the Food Safety and Standards Authority of India (FSSAI) introduced the Food Safety and Standards (Fortification of Foods) Regulations in 2016.

The FSSAI defines fortification as the deliberate increase of essential micronutrients in food to enhance nutritional quality and provide public health benefits while minimizing health risks.

Why is Fortification necessary?

Fortification is crucial in India due to the deficiencies among the population, and as the majority of Indians follow a cereal-dominated diet. Common deficiencies include iron, vitamin A, iodine, vitamin D, and vitamin B12, leading to various health problems. Economic, cultural, and accessibility challenges limit dietary diversity, resulting in low nutrient intake (1).

Staple foods like rice, wheat, salt, milk, and edible oil are frequently consumed, making them ideal vehicles for fortification. This cost-effective strategy can improve overall nutritional status without major dietary changes. It can also address issues arising from seasonal food variability.

The FSSAI focuses on fortifying Wheat Flour and Rice (with Iron, Vitamin B12, and Folic Acid), Milk and Edible Oil (with Vitamins A and D), and Double Fortified Salt (with Iodine and Iron) to combat micronutrient malnutrition.

These efforts target deficiencies like anaemia, vitamin A, and iodine disorders. To help consumers, the '+F' logo signifies fortified foods (2).

Key fortification techniques used: For large-scale fortification at the industrial level, several methods are employed to ensure a uniform distribution of essential micronutrients in staple foods (3):

- **Blending/Mixing:** This method is crucial for incorporating micronutrients into powdered or granulated staples, such as wheat flour, maize flour, and sugar.

Kellogg's

MULTIGRAIN +NO MAIDA

- High Fibre
- High Protein
- Zero Added Preservatives

Creative Visualization. Suggested Serving.

Dry micronutrient premixes are meticulously blended with the staple in high-speed mixers. This process ensures homogeneity, reducing the risk of nutrient deficiency in the final product.

- Extrusion (Rice Fortification): Extrusion is the primary technique used for fortifying rice. In India, extrusion technology is commonly used to create rice-like fortified kernels that resemble normal rice. In this process, rice flour is combined with specific micronutrients and then extruded through specialized machinery to form Fortified Rice Kernels (FRK). These kernels are designed to closely resemble natural rice grains, allowing for easy integration. The FRK is blended with regular rice in a precise ratio of 1:100, ensuring that every serving provides added nutritional benefits (4).

- Coating method: In this, a premix containing vitamins and minerals is dissolved or suspended in a liquid medium (such as water, oil, or a food-grade binder) and sprayed onto the surface of food grains or particles while they are mixed or tumbled in a rotating drum. The coating, usually of ethyl cellulose, forms a thin layer on the surface of the grain, and sometimes a protective layer is added to prevent nutrient loss during washing, storage, or cooking. It often requires adhesives and binders like waxes (beeswax, carnauba), gums (gum arabic), tragacanth, and hydrocolloids to ensure the nutrients stick to the surface.This method is widely used in fortified rice kernels, salt, breakfast cereals, and edible oil fortification (5).

- Dusting method: Here, dry micronutrient premix powder is directly mixed with the food product so that fine particles adhere to the surface of the grains or food particles, relying on electrostatic forces to stick to the surface, or by mixing it directly with the powder/flour. This is a simpler and lower-cost method compared to coating; still, it has some limitations,like uneven distribution, nutrient losses during handling, and the possibility that the fortificant powder may separate during transport. Dusting is commonly used on foods like wheat flour, salt, and some snack seasonings. It is easier and more economical, but may be less stable and less uniform in nutrient distribution than coating (6).

- Spraying: It is a widely used method in food fortification. In the surface spraying process, vitamins and minerals are first dissolved or suspended in a liquid solution (water or oil), and this micronutrient solution is then sprayed onto the food surface using fine spray nozzles while the food is continuously mixed or tumbled in a rotating drum or mixer. The spraying ensures a more uniform distribution of micronutrients compared to simple dusting. After spraying, the product is usually dried or cooled so that the nutrients adhere properly to the surface and remain stable during storage and transportation. Spraying is especially useful for heat-sensitive vitamins such as vitamins A and D, which are often sprayed onto breakfast cereals, dried milk, margarine or added to edible oils after processing to avoid nutrient loss during heating. Overall, spraying is considered more uniform and stable than dusting, but slightly more complex and costly than simple dry mixing methods (7).

Among these methods, extrusion and coating provide better nutrient stability and uniformity, whereas dusting and dry blending are more economical but may lead to uneven distribution and nutrient losses during storage and transportation. The choice of fortification method depends on the food vehicle, cost, stability of micronutrients, and scale of production.

Standards for Fortification of Staple Foods:

1) Iodized Salts: Salt should be fortified with iodine; when it also contains iron, it is referred to as double fortification. The nutrient used for iodine is potassium iodate, which is typically added at levels of 20-30 parts per million (ppm) based on the dry weight. For iron, either ferrous sulphate or ferrous fumarate is added in amounts ranging from 850 to 1,100 ppm.

2) Fortified Oil: Vegetable oil can be fortified with vitamins A and D. For vitamin A, the sources used are retinyl acetate or retinyl palmitate, with a concentration of 6 to 9.9 micrograms of retinol equivalents (µg RE) per gram of oil. For vitamin D, either cholecalciferol or ergocalciferol is added, with levels ranging from 0.11 to 0.16 µg per gram of oil.

3) Fortified Milk:
Milk from various sources, such as buffalo, cow, goat, sheep, and camel, can be fortified. Different types of milk, including full cream milk, toned milk, double toned milk, skimmed milk, and standardized milkcan be enhanced with the following vitamins:
Vitamin A: Added as either Retinyl acetate or Retinyl palmitate at levels of 270-450µ g RE/L
Vitamin D: Added as either Cholecalciferol or Ergocalciferol at levels of 5-7.5 µg/L.

4) Fortified Whole Wheat Flour and Fortified raw rice:
The most common nutrients used for fortifying cereal include iron, folic acid, and Vitamin B12. The specific details for fortification are:
Iron: The most effective forms include:Ferrous citrate, Ferrous lactate, Ferrous sulphate, Ferric pyrophosphate, Electrolytic iron, Ferrous fumarate, Ferrous bisglycinate, Sodium Iron (III) Ethylene Diamine Tetraacetate Trihydrate (Sodium feredetate-Na Fe EDTA). Iron can be added at levels ranging from 28 mg to 42.5 mg per kg or 14 mg to 21.25 mg per kg for Sodium feredetate.This higher level compensates for lower bioavailability.
Folic Acid: Added at levels of 75 µg to 125 µg per kg.
Vitamin B12: Cyanocobalamin or Hydroxycobalamin can be added at levels of 0.75 µg to 1.25 µg per kg.

Additionally, whole wheat flour can be fortified with Zinc, in the form of Zinc sulphate, at levels of 10 mg to 15 mg per kg.Vitamin A as Retinyl acetate or Retinyl palmitate, at concentrations of 500 µg RE to 750 µg RE per kg. Vitamin B1 can be added as Thiamine hydrochloride or Thiamine mononitrate, at levels of 1 mg to 1.5 mg per kg.Vitamin B2,in the form of Riboflavin or Riboflavin 5'-phosphate sodium, at levels of 1.25 mg to 1.75 mg per kg.Vitamin B3 as Nicotinamide or Nicotinic acid, at levels of 12.5 mg to 20 mg per kg.Vitamin B6, in the form of Pyridoxine hydrochloride, at levels of 1.5 mg to 2.5 mg per kg.

Multi-grain atta can also be fortified with vitamins and minerals at the same levels specified for fortified atta, as long as the multi-grain atta contains more than 50% wheat flour (8).

Standards for Fortification of Processed Foods:

1) Fortified Cereals: This category includes pasta, noodles, and breakfast cereals.
2) Fortified Bakery Products: This includes bread, biscuits, rusks, and buns.
Both categories of food products, when fortified, must include added iron, folic acid, and Vitamin B12 at specified levels:
Iron: Can be added in the form of Ferrous citrate, Ferrous lactate, Ferrous sulphate, Ferric pyrophosphate, electrolytic iron, Ferrous fumarate, Ferrous bisglycinate, or Sodium feredetate at a concentration of 1.4-2.7 mg per 100 g.
Folic Acid should be added at a level of 8-16 µg per 100 g.
Vitamin B12 can be included as Cyanocobalamin or Hydroxycobalamin at levels of 0.08-0.16 µg per 100 g.
Additionally, manufacturers may choose to include:
Zinc, as Zinc sulphate at 1.0-1.9 mg per 100 g
Vitamin A as Retinyl acetate or Retinyl palmitate at 48-96 µg RE per 100 g
Vitamin B1 as Thiamine hydrochloride or Thiamine mononitrate at 0.1-0.19 mg per 100 g
Vitamin B2 as Riboflavin or Riboflavin 5'-phosphate sodium at 0.11-0.22 mg per 100 g
Vitamin B3 as Nicotinamide or Nicotinic acid at 1.3-2.6 mg per 100 g
Vitamin B6 as Pyridoxine hydrochloride at 0.2-0.3 mg per 100 g
These vitamins and minerals can be used in fortification either individually or in combination.

3) Fortified Juices: These juices are fortified with Vitamin C in the form of Ascorbic acid at a concentration of 6-12 mg per 100 mL. Other nutrients like Vitamin D, iron, and calcium are also added. They are often positioned as convenient functional beverages, especially for populations with low dairy intake (e.g., calcium-fortified orange juice). Here, the concerning point is the sugar content of the drink and the absence of fibre.

While these fortification levels are designed to address population-level deficiencies, there is ongoing debate regarding uniform fortification levels for diverse populations with varying dietary patterns. Excess intake may occur in urban populations consuming multiple fortified foods, while rural populations may still face deficiencies due to lower access to fortified products.

Comparison with Other Countries in Food Fortification Strategies

India's Food Safety and Standards Authority of India (FSSAI) has established fortification regulations that majorly target widely consumed staples. This focus is a response to the country's cereal-heavy diet, which has led to prevalent deficiencies in essential nutrients such as iron, vitamin A, and iodine. By fortifying these staples, the aim is to reach a vast segment of the population through PDS and government feeding programs. While voluntary fortification is generally practiced, it becomes mandatory in specific government schemes. However, ongoing debates showcase various challenges, like compliance issues, the bioavailability of nutrients, and the risk of overconsumption from multiple fortified sources, especially among urban populations.

In the United States and several Asian countries, a more diversified approach to food fortification involves a blend of mandatory fortification, targeted interventions, and supplementation programs.

These differences are because of varying dietary patterns, the specific deficiencies prevalent in each region, and regulatory frameworks. In the U.S., for instance, folic acid is commonly added to wheat flour and cereals, and vitamin D is fortified in milk. The targeted fortification approach is particularly notable; for example, the mandatory fortification of folic acid in cereal grains was implemented to reduce the incidence of neural tube defects (NTDs) (9).

In various other Asian countries, targeted food fortification strategies are applied. The focus is on staple items such as sugar, oils, salt, and cereals. For example, in China, soy sauce is fortified with NaFeEDTA as part of a national strategy to address the widespread issue of iron deficiency anaemia (10).

A key difference between India and many developed countries is that India relies heavily on staple food fortification to reach large populations, whereas countries like the United States focus on targeted fortification of specific foods such as flour and milk, supported by strong dietary intake monitoring systems.

Several Southeast Asian countries have mandatory fortification programs, while India largely follows a voluntary fortification model except in government feeding programs. These differences reflect variations in dietary patterns, regulatory capacity, and public health priorities. Overall, while the strategies and implementations of food fortification vary across countries, the basic goal remains the same, that is, to enhance public health by combating nutritional deficiencies and improving the overall dietary quality.

Challenges and Concerns in Food Fortification:

Food fortification also presents several challenges and concerns. One major issue is the bioavailability of added nutrients, particularly iron, which may not be well absorbed in cereal-based diets high in phytates, thereby limiting the actual nutritional benefit.

Another concern is the risk of overconsumption, especially in urban populations that consume multiple fortified foods such as fortified flour, rice, milk, breakfast cereals, and supplements, which may lead to excessive intake of certain micronutrients over time. There are also technical and compliance challenges, including uneven distribution of nutrients, stability losses during storage and cooking, and inconsistent quality control among small-scale manufacturers.

Hence, it should be implemented alongside dietary diversification, nutrition education, and strong monitoring systems to ensure both safety and effectiveness.

Conclusion: Food fortification is an important public health strategy to address micronutrient deficiencies, especially in countries with large populations and limited dietary diversity.

However, fortification should be seen as a complementary strategy rather than a substitute for a balanced and diverse diet.

References:

1) https://pmc.ncbi.nlm.nih.gov/articles/PMC9641006/#sec3

2) https://fssai.gov.in/cms/fortified-food.php

3) https://www.fssai.gov.in/upload/uploadfiles/files/Compendium_Food_Fortification_Regulations_30_09_2021.pdf

4) https://ceffniftem.com/Home/fih#:~:text=Globally%2C%20India%20leads%20in%20rice,Flow%20for%20Fortified%20Rice%20Production

5) https://www.sciencedirect.com/science/article/abs/pii/S0963996903001017#:~:text=Xylan%2D%20and%20mannan%2Dbased%20films,reinforcement%20affect%20the%20material%20properties.

6) https://www.fao.org/4/w2840e/w2840e0b.htm

7) https://www.intechopen.com/chapters/1214313

8) https://www.fssai.gov.in/upload/uploadfiles/files/Compendium_Food_Fortification_Regulations_04_03_2021.pdf

9) https://pubmed.ncbi.nlm.nih.gov/20629350/

10) https://ilsi.org/ilsi-focal-point-in-china-iron-fortified-soy-sauce/#:~:text=ILSI%20Focal%20Point%20in%20China%20organized%20a%20national%20food%20fortification,Publications

FROM TRADITION TO TECHNOLOGY: THE NEXT CHAPTER IN OAT INNOVATION

By
Ms Anuja Padte,
Food Scientist, PFNDAI

Introduction: Reimagining a Humble Grain

Oats (*Avena sativa*) has come a long way from being a simple cereal associated with porridge and animal feed. Over the past decade, this grainhas quietly moved into the spotlight as one of the most versatile and scientifically relevant grains in the food industry.

What makes this shift interesting is that it is not driven by a single factor. It is the result of multiple forces coming together—growing awareness of lifestyle diseases, demand for clean-label foods, and significant advancements in food processing technologies.

As a result, oats are no longer viewed as just a wholesome grain; they are now seen as a functional ingredient with wide industrial applications.

A Nutritional Foundation That Supports Innovation

Before looking at applications, it is important to understand why oats have gained so much attention in the first place. Their composition offers a strong foundation for both health and functionality.

Unlike many refined cereals, oats are commonly consumed as a whole grain, which means their fibre, micronutrients, and bioactive compounds are retained. This makes them particularly relevant in today's context of preventive nutrition.

Table: Nutritional Composition of Oats per 100 g

Component	Content
Carbohydrates	66–68 g
Protein	13–17 g
Fat (mostly unsaturated)	6–7 g
Dietary Fibre (-glucan)	2–8 g
Minerals	Iron, Zinc, Magnesium
Bio actives	Avenanthramides, Phenolics

From: https://regencyhealthcare.in/blog/oats-nutritional-value/

Saffola®

COLD PRESSED OILS

COMPLETELY PURE, COMPLETELY GOOD

Saffola®

Mustard

Sesame

Groundnut

*Creative Visualization

Unlike many refined cereals, oats are commonly consumed as a whole grain, which means their fibre, micronutrients, and bioactive compounds are retained. This makes them particularly relevant in today's context of preventive nutrition.

From Traditional Use to Functional Ingredient

Traditionally, oats were consumed in simple forms—porridge, basic bakery products, or as animal feed to providing energy and fibre.
Today, however, the narrative has changed. Oats are being used in:

- Plant-based beverages
- Breakfast cereals and snack bars
- Clinical and sports nutrition
- Infant and specialised foods

This shift reflects a broader change in how we view food—not just as sustenance, but as a tool for improving health outcomes.

The Science That Sets Oats Apart

What gives oats their functional edge is their unique combination of bioactive components.

β-Glucan, a soluble fibre, plays a key role in lowering cholesterol and improving glycemic response. Its ability to form a viscous gel in the digestive system is what makes it so effective.

Then there are avenanthramides, compounds found almost exclusively in oats. These have strong antioxidant and anti-inflammatory properties, making oats relevant not just in food, but also in nutraceutical and wellness applications.

From a formulation standpoint, oats also contain slowly digestible and resistant starch, which supports sustained energy release and gut health.

Processing of Oats: Where the Real Transformation Happens

In their raw state, oats are not inherently shelf-stable and are difficult to digest. It is only through carefully controlled processing that they are converted into safe, stable, and functional food ingredients suitable for modern applications.

Unlike many other cereals, oats present a unique challenge due to their higher lipid content and active enzyme system, particularly lipase. If not stabilised early, this can rapidly lead to rancidity and off-flavours, making processing a critical control point in the oat value chain.

Core Processing Steps

The journey from oat grain to finished product involves a sequence of mechanical and thermal operations:

- Cleaning and Grading
  Removal of foreign materials such as stones, dust, and other grains to ensure product safety and quality.
- Dehulling
  The outer fibrous hull, which is indigestible, is removed to obtain the oat groat—the edible portion rich in nutrients.
- Kilning (Hydrothermal Stabilisation)
  A crucial step where controlled heat treatment inactivates lipase enzymes, preventing lipid oxidation and improving shelf life, while also contributing to flavour development.
- Cutting, Rolling, or Grinding
  The stabilised groats are further processed into various forms such as steel-cut oats, rolled oats, flakes, or oat flour, depending on the final application.

From a processing standpoint, stabilisation is the most critical step, as it directly determines product shelf life, sensory quality, and commercial viability.

Advances in Processing Technologies

What is particularly exciting today is how modern processing technologies are expanding the possibilities of oats far beyond traditional uses.

- **Hydrothermal Stabilisation**

A fundamental step in oat processing, hydrothermal stabilisation uses controlled heat and moisture to inactivate lipase enzymes, thereby preventing rancidity and extending shelf life. It also contributes to the characteristic flavour of oat products.

Typical applications: Rolled oats, oat flakes, oat flour, and ready-to-cook oat products.

- **Extrusion Technology**

Extrusion involves high temperature and pressure applied over a short time, enabling structural and functional transformation of oats. This process improves digestibility, develops crisp and expanded textures, and supports large-scale production of convenience foods.

Typical applications: Breakfast cereals (oat puffs, rings), granola clusters, snack bars, and extruded oat-based snacks.

- **High Hydrostatic Pressure (HHP)**

HHP is a non-thermal processing technology that uses high pressure to ensure microbial safety while preserving nutrients, flavour, and colour. It is particularly relevant for clean-label and minimally processed products.

Typical applications: Premium oat milk, functional oat beverages, refrigerated oat drinks, and clean-label liquid formulations.

- **Enzymatic Processing**

Enzymatic processing plays a crucial role in improving the functionality of oats, particularly in liquid applications. Due to the naturally high starch content of oats, uncontrolled processing can result in excessive viscosity and an undesirable texture.

The use of enzymes such as α-amylase helps hydrolyse starch into simpler sugars, leading to better texture, reduced viscosity, and natural sweetness without the need for added sugars.

Typical processing sequence: milling $\rightarrow$ slurry formation $\rightarrow$ enzymatic hydrolysis $\rightarrow$ filtration $\rightarrow$ homogenisation $\rightarrow$ heat treatment

Typical applications: Oat milk, oat-based beverages, nutritional drinks, and β-glucan enriched functional products.

Processing Applications:

From Technology to Consumer Products

Modern processing technologies enable oats to be transformed into a wide range of consumer-friendly products. The following examples highlight how different processing approaches are applied at the product level.

Oat Milk

Oat milk production involves converting oats into a stable, milk-like beverage through a combination of mechanical and enzymatic steps. The process begins with milling and slurry preparation, followed by controlled enzymatic hydrolysis to manage starch and viscosity.

The liquid is then filtered to remove insoluble fractions and homogenised to create a smooth, stable emulsion. Final heat treatment ensures safety and shelf life.

Technology used: Enzymatic processing, homogenisation, thermal processing

Outcome: Smooth texture, mild natural sweetness, stable plant-based beverage

Granola and Cereal Clusters

In granola and cereal clusters, oats act as both a structural and nutritional component. The process involves mixing oats with sweeteners (such as syrups or honey) and inclusions like nuts or seeds, followed by baking or extrusion. Controlled heating helps develop crispness, flavour, and cluster formation, while maintaining the fibre content of oats.

Technology used: Baking, extrusion, thermal processing

Outcome: Crisp texture, extended shelf life, nutrient-dense snack products

Instant Oat Porridges

Instant oats are designed for rapid preparation without compromising nutritional quality. The process typically includes rolling or flaking of stabilised oats, followed by pre-cooking (steam treatment) and drying. This pre-gelatinisation of starch allows the product to rehydrate quickly when hot water or milk is added.

Technology used: Rolling/flaking, hydrothermal processing, drying

Outcome: Quick-cooking, convenient product with retained fibre and functionality

Industry Insight: Why Processing Matters in Oats

Modern oat processing is not defined by a single technology, but by how multiple processes work together. A combination of thermal stabilisation, enzymatic treatment, and mechanical processing enables oats to be transformed from a raw grain into a stable, functional, and consumer-ready ingredient.

From a food technology perspective, this integration is what drives:

- Improved shelf life and product stability
- Enhanced texture, taste, and overall acceptability
- Better retention and delivery of functional components such as β-glucan

In essence, processing is what unlocks the true value of oats in today's food systems.

The Indian Context: A Practical Advantage

In India, oats are primarily grown during the Rabi season and has traditionally been used as fodder. However, this is gradually changing.

From a sustainability perspective, oats offers clear advantages:

- Lower water requirement compared to rice and wheat
- Shorter crop cycle
- Adaptability to different regions

These factors make oats a strong candidate for crop diversification, especially in water-stressed areas.

Market Trends: Where Science Meets Consumer Demand

India's regulatory support, led by the Food Safety and Standards Authority of India, has strengthened the positioning of oats as a health-focused ingredient, particularly through approved claims related to soluble fibre.

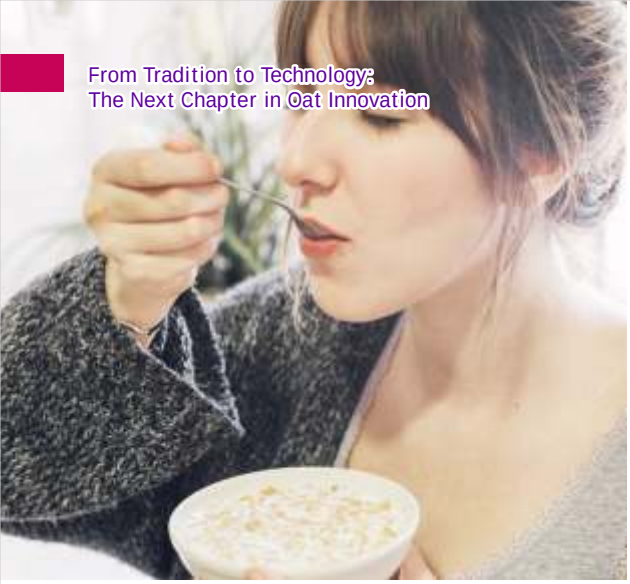
At the same time, evolving urban lifestyles are driving demand for foods that are:

- Convenient
- Health-oriented
- Clean-label and minimally processed

This shift has accelerated the growth of oat-based products, positioning the grain as high-value, consumer-friendly offerings.

Key product segments include:

- Oat Milk: A fast-growing plant-based beverage



among lactose-intolerant and vegan consumers.

- Granola and Cereal Clusters: Premium snack options valued for their texture, fibre content, and nutritional appeal.
- Instant Oat Porridges: Convenience-driven products designed for quick preparation without compromising nutritional quality.

Together, these categories reflect the premiumisation and diversification of oats in the Indian market.

Conclusion

The evolution of oats from a traditional grain to a modern functional ingredient reflects the dynamic transformation of the global food landscape. Supported by scientific validation, processing innovation, and changing consumer preferences, oats have emerged as a versatile and sustainable component of contemporary diets.

For food professionals, oats represent a convergence of nutritional efficacy, technological advancement, and market relevance. In India, their potential extends further—offering pathways for crop diversification, value addition, and improved public health outcomes. As the demand for health-oriented and sustainable foods continues to rise, oats are well positioned not only to meet these expectations but to help shape the future of food.

References

1. Prasanthi et al. (2025). Oats (Avena sativa) as a Functional Food: Nutritional Significance, Processing Approaches and Multifaceted Applications. Journal of Scientific Research and Reports, 31(5), 574-588 (https://journaljsrr.com/index.php/JSRR/article/view/3054)

2. Thamilnesan & Cheng (2025). Advancements in oat processing technologies and their impact on nutritional and functional properties: a review. Nutrition & Food Science, 55(4), 783–800 (https://www.emerald.com/nfs/article-abstract/55/4/783/1264134/Advancements-in-oat-processing-technologies-and)

3. Chand et al. (2025). Analyzing trends and future projections in fodder oats (Avena sativa L.) for quality seed production in India. Frontiers in Plant Science, 16 (https://www.frontiersin.org/journals/plant-science/articles/10.3389/fpls.2025.1525422/abstract)

4. National Institute of Food Technology Entrepreneurship and Management (NIFTEM) (2022). Oats - Processing and Value Addition (https://niftem.ac.in/newsite/pmfme/wp-content/uploads/2022/07/oatsprocessing.pdf)

5. Food Safety and Standards Authority of India (FSSAI) (2019/2024). Guidance on Health and Nutrition Claims (Beta-glucan and Soluble Fibre) (https://fssai.gov.in/upload/advisories/2019/06/5d164a5daa382Direction_Advertising_Claims_28_06_2019.pdf)

REPORT OF NUTRITION AWARENESS ACTIVITY ON "DAIRY 2.0: THE SYNERGY OF NUTRITION, INNOVATION, AND QUALITY"

By
Ms Anuja Padte,
Food Scientist, PFNDAI

Protein Foods and Nutrition Development Association of India (PFNDAI), in collaboration with Parul University, Vadodara, organized a Nutrition Awareness Activity on "Dairy 2.0: The Synergy of Nutrition, Innovation, and Quality" on 11th March 2026.

The event was sponsored by Mother Dairy and Zydus Wellness and was attended by students from Food and Dairy Technology colleges across Gujarat.

The event began with a welcome address by Dr. Shashank Bhalkar,

Executive Director, PFNDAI, who provided an overview of PFNDAI and its initiatives. This was followed by the felicitation of speakers, judges, and sponsor representatives.

The program commenced with a Hackathon Contest, where students were given problem statements and 5 minutes each to present their ideas to the judges. Two separate contests were conducted— one led by Mother Dairy, judged by Ms. Mani Misra and Dr. Shashank Bhalkar, and the other by Zydus Wellness, judged by Ms. Arohi Bapna and Dr. Preeti Shrinivas.

Following the contest, the scientific session began with Dr. Preeti Shrinivas, Head of Innovation

Excellence at Zydus Wellness. She highlighted evolving consumer demands and key growth drivers in India, including the preventive health mindset and increasing awareness of the protein gap.

She emphasized trends such as clean label products, functional foods targeting gut health and immunity, and transparency in food systems. She also explained a stage-gate innovation model that balances taste, health, transparency, and regulatory compliance.

The next session was delivered by Mr. Gokulakrishnan S S, Assistant General Manager – Quality Assurance and R&D at Amul Dairy. He presented insights on the transformation of the Indian dairy sector from traditional practices to advanced automated systems. He emphasized the importance of food safety systems such as HACCP and Good Manufacturing Practices (GMP) in ensuring product quality and safety. He also highlighted future focus areas such as improving milch animal productivity, strengthening milk procurement systems, and implementing residue monitoring programs.

The final session was delivered by Ms. Mani Misra, Scientific Regulatory Affairs & Nutrition at Mother Dairy, who discussed the role of milk in post-exercise recovery. She explained the concept of the "3 R's" of recovery—Refuel, Rehydrate, and Repair—and highlighted milk as a natural recovery beverage due to its balanced composition of carbohydrates, proteins, fluids, and electrolytes. She also emphasized that milk is a cost-effective and accessible alternative to commercial sports drinks.

Following the speaker sessions, the winners of the hackathon were announced. The entries were evaluated based on concept, problem-solving approach, execution, and clarity of presentation.

For the Zydus Wellness Contest:

- 1st Prize: Ms. Shourya Sharma & Ms. Sanvi Bandal (Parul University) for "Development of Lactose-Free High Protein Plant-Based Beverage using Soya Milk and Pumpkin Seeds"
- 2nd Prize: Ms. Nimanshi Pandey & Ms. Manisha Singh (Parul University) for "Development of a Novel Upcycled Dairy Product"
- Consolation Prize: Patel Vrajkumar Bhaveshbhai & Gauswami Pravinbhai Aambpuri (G.N. Patel College of Dairy Science) for "Stabilization of High Protein Dairy-Based RTDs while Preserving Sensory Quality"

Dr Vijay Kele Parul University

For the Mother Dairy Contest:

- 1st Prize: Ms. Tisha Chandresh Choksi & Ms. Akriti Arvind Maurya (Parul University) for "High protein dairy for fitness".
- 2nd Prize: Ms. Himanee Prajapati & Mr. Sagar Patel (SMC Dairy College, Anand)for "High protein dairy for fitness".
- Consolation Prize: Mr. Krishant Chauhan & Mr. Harsh Solanki (Parul University) for "Lactose-free / A2 dairy Consumer Need & Market Drivers".

The event concluded with the felicitation of winning students. Overall, the activity provided a valuable platform for students to showcase innovation, gain industry insights, and understand emerging trends in the dairy sector, strengthening the link between academia and industry.

At the close of the activity Ms. Dolly Soni delivered a heartfelt vote of thanks. She expressed gratitude to the sponsors, speakers, Judges, Students and the PFNDAI team members for their invaluable contributions in making the event a resounding success.

Winners






REGULATORY ROUND UP

AUTHOR
Dr Shashank Bhalkar,
Executive Director, PFNDAI
executivedirector@pfndai.org

Dear Readers,

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

Advisory regarding mandatory registration/license by Milk Producers (other than members of dairy cooperative societies) / Milk Vendors :

Food authorities have observed that certain milk producers are operating their business without registration. This advisory is for the mandatory FSSAI registration/licensing of all milk producers other than members of dairy cooperative societies/ milk vendors.

Draft Food Safety and Standards (Packaging) Amendment Regulations, 2026, regarding the inclusion of additional definitions in the Regulation :

The draft regulation proposes many additional definitions regarding packaging. They include: food contact material, food grade contact material, modified atmosphere packaging, food packaging, non-intentionally added substances, and aseptic packaging. Any suggestions or objections should be sent in the prescribed format should be sent within sixty days from 26.02.2026.

Food Safety and Standards (Licensing and Registration of Food Businesses) Amendment Regulations, 2026 :

Food authorities have come out with an amendment in FSS (Licensing and registrations) Regulations 2011 with far-reaching consequences. As per the regulations, the definition of Petty Food Business operator is revised. Street food vendors, hawkers, food trucks, carts and any such other food businesses that are registered under the Street Vendors (Protection of Livelihood and Regulation of Street Vending) Act 2014, will be considered registered, provided they comply with Schedule 4 for hygiene and sanitary requirements.

The turnover threshold for granting registration for various businesses will be decided by the Food Authority. The license of FBOs will be suspended in case they fail to pay the license or registration fee or if the returns are filed before the due date. The license shall be revoked after paying fees or filing returns with a penalty.

Any food business activity during the suspension period will be considered non-compliant. FBOs shall inform the authorities in writing within thirty days in case of closure of the business and surrender their licence/ certificate. The commissioner of food safety shall plan inspections in his jurisdiction based on the risk of the business or establishment. FSO or specifically authorised officer shall carry out inspections of registered or licensed FBOs periodically as decided by the respective commissioner. FBO is required to carry out a third-party food safety audit by an auditing agency or auditors recognised by FSSAI. He is required to grant access to his records.

Implementation of revised turnover threshold for food businesses under Food Safety and Standards (Licensing and Registration of Food Businesses) Regulations, 2011 : This order from the Food Authorities is about indicating turnover thresholds under FSS (Licensing and Registration of Food Businesses) Regulations 2011. As per this order, turnover thresholds for registration and licensing are defined. Registration: Turnover up to 1.5 Cr. State Licence: Turnover more than 1.5 Cr up to 50 Cr. Central Licence: Turnover above 50 Cr. This revised threshold will be in effect from 01.04.2026.

Compliance obligations of E-commerce FBOs in the context of Open Network for Digital Commerce model : The Open Network Digital Commerce (ONDC) model of online selling involves multiple entities, such as buyer-side platforms (called as buyer Apps) and seller-side platforms (called as seller Apps). Food authorities have reviewed the regulations related to e-commerce FBOs for this open network model. As per these regulations, the clear demarcation of liabilities and obligations divided between the entities in this model is defined and given in detail in the Annexure. This regulation will come into effect from 01/04/2026. This removes ambiguity about the responsibility in case of any dispute.

Implementation of 'Food Recall' functionality under Food Safety Compliance System (FoSCoS) : Food Recall is regulated by FSS(Food Recall Procedure Regulations) 2017. The recall procedure involves regulators, FBOs, and consumers. The Food authorities have implemented the recall procedure on the FoSCoS system via this order. The functionality of the DOs/Central licensing Authorities, FBOs, and consumers on the FoSCoS system is described in order. This is applicable from 18/03/2026.

Food Safety and Standards (Labelling and Display) First Amendment Regulations, 2026 relating to exemption of RDA in case of Infant nutrition products, Non-retail containers etc. : This important Gazette notification about the amendment in FSS (L&D) Regulations 2020. Several changes are suggested in the labelling regulation. They include: Exemption of % RDA for infant nutrition products, considering minimally processed ingredients like cereals, pulses, fruits, and vegetables as single ingredients, exemption of logo when the surface area of the package is more than 100 square cm, declaration of mandatory information on the non-retail package, etc. The amendments shall come into force from 01/07/2027.

RESEARCH IN HEALTH & NUTRITION

Vitamin E research finds tocotrienols outperform tocopherols in preventing cell death

The study published in Scientific Reports highlights tocotrienols, a lesser-known form of vitamin E, as significantly more effective than tocopherols in preventing ferroptosis, a type of iron-dependent cell death driven by lipid peroxidation.

Researchers at Tohoku University demonstrated that tocotrienols suppressed lipid oxidation at lower concentrations across multiple experimental models, showing approximately fifteen times greater potency than tocopherols in GPX4-deficient systems. Importantly, tocotrienols also exhibited lower cellular toxicity compared to standard ferroptosis inhibitors.

The findings provide mechanistic insight into how tocotrienols intercept lipid peroxidation cascades central to ferroptosis, positioning them as promising candidates for longevity-focused nutraceuticals and functional foods. Ferroptosis has gained recognition over the past decade as a distinct form of programmed cell death implicated in aging, cardiovascular disease, metabolic disorders, and neurodegenerative conditions.

By demonstrating superior antioxidant behaviour in this context, tocotrienols are being recognized as more than just an alternative form of vitamin E. While further in vivo and clinical studies are needed, the results strengthen interest in tocotrienols for healthy aging, metabolic health, and oxidative stress management, suggesting they may play a pivotal role in future nutritional and wellness applications.

https://www.nutritioninsight.com/news/tocotrienols-prevent-ferroptosis-cell-death.html

Higher omega-3 status linked to lower risk of early-onset dementia

A large prospective study using UK Biobank data has linked higher omega-3 fatty acid status to a significantly lower risk of early-onset dementia, defined as diagnosis before age 65.

Population & Scale: Over 217,000 middle-aged adults were tracked.

Risk Reduction: Higher omega-3 intake was associated with a 35–40% lower risk of early-onset dementia, independent of genetic predisposition.

Beyond DHA: While docosahexaenoic acid (DHA) is the most studied omega-3, the analysis suggested that non-DHA omega-3s (ALA, SDA, EPA, DPA) may also contribute to brain health, with stronger associations observed for these fatty acids collectively.

Mechanisms: Anti-inflammatory effects, influence on membrane properties, gene expression, and conversion to lipid mediators are proposed pathways for neuroprotection.

Cognitive Health Role: Omega-3s are recognized for supporting brain development, reducing inflammation, and preserving cognition. Previous studies have linked them to lower risks of dementia, Alzheimer's disease, depression, and anxiety.

Intake Levels: Daily consumption of around 1,600 mg of DHA and EPA, achievable through fish, seafood, or supplements, was noted as sufficient to raise omega-3 indexes from the lowest quintile.

Limitations: The study was observational, preventing causal conclusions. Independent effects of individual omega-3s could not be fully assessed due to data constraints.

Public Health Gap: More than 76% of consumers fail to meet recommended omega-3 intake levels, with inconsistent guidance across regions.

Call for Action: Researchers argue that diet should be included in global dementia prevention strategies, noting its absence from current frameworks like the Lancet Commission's list of modifiable risk factors.

Future Research: A pooled analysis of nearly 20 cohorts worldwide on omega-3 biomarkers and dementia incidence is underway, expected to be the largest study of its kind.

This research underscores omega-3 fatty acids as a potentially cost-effective, safe, and accessible dietary strategy to reduce dementia risk, while highlighting the need for unified global dietary guidance.

https://www.vitafoodsinsights.com/omega-3-fatty-acids/higher-omega-3-status-linked-to-lower-risk-of-early-onset-dementia

MSG debunks longtime myths to boost umami, satiety in formulations

Invention & History

MSG was invented in 1908 by Japanese chemist Kikunae Ikeda, who extracted glutamate from seaweed broth to enhance umami flavour. Modern production uses fermentation of starchy vegetables like sugar beets. Japanese imperialism spread MSG to China, and during World War II, U.S.–China alliances introduced MSG-rich foods into the American diet.

Origins of the Myth

In 1968, pediatrician Robert Ho Man Kwok reported feeling ill after eating Northern Chinese food, sparking speculation that MSG was the cause. This led to the "Chinese Restaurant Syndrome" scare, later renamed "MSG symptom complex."Anecdotal reports described a wide range of symptoms, but scientific studies found no consistent evidence linking MSG to adverse health effects.

Safety & Toxicology

The U.S. FDA classifies MSG as GRAS (Generally Recognized As Safe).Global health authorities agree with this classification. Studies, including those published in the Journal of Nutrition, show no evidence that MSG ingestion is associated with adverse reactions in the general population. Despite lingering perceptions, MSG remains widely used in processed foods, soups, and frozen meals.

Flavour Science & Umami Enhancement

MSG activates umami taste receptors (T1R1/T1R3) on the tongue, producing a rich savoury flavour. It enhances mouthfeel, deepens savoury notes, and balances sharp or flat flavours. A small amount can make broths, sauces, and proteins taste more satisfying without added fat, sugar, or sodium. MSG synergizes with compounds like IMP and GMP found in mushrooms, tomatoes, aged cheeses, and broths, creating a stronger savoury signal than any component alone.

Functional Potential & Satiety

MSG may contribute to satiety by making meals feel more complete and satisfying, even in smaller portions. This has potential relevance for individuals managing appetite through lifestyle or medications such as GLP-1 agonists. In food development, MSG helps smooth bitter or sharp notes in high-protein or fortified foods.

Conclusion

MSG is a safe, versatile, and powerful flavour enhancer. Its negative reputation stems from cultural bias and xenophobic narratives rather than scientific evidence. It remains a valuable tool in modern food science, both for flavour enhancement and potential functional benefits.

https://www.supplysidefbj.com/food-ingredients/msg-debunks-long-time-myths-to-boost-umami-satiety-in-formulations

Vitamin K2 and active folate may reduce risk of cardiovascular disease

The article highlights growing scientific and commercial interest in vitamin K2 and active folate as complementary nutrients for cardiovascular health.

Deficiencies in both are widespread, with research showing that up to 97% of Western populations lack sufficient vitamin K2 and more than half of the global population has inadequate folate intake. These gaps are linked not only to cardiovascular disease but also to bone and reproductive health concerns.

MK-7 (vitamin K2) has been the subject of more than twenty-two human clinical trials, while active folate has gained recognition for its stability and bioavailability compared to synthetic folic acid. Active folate supports homocysteine metabolism, reducing vascular risk, while vitamin K2 contributes to arterial flexibility and bone strength.

Formulation challenges arise when combining fat-soluble vitamin K2 with water-soluble folate, requiring careful management of stability, delivery systems, and excipients. Encapsulation technologies such as liposomes or softgels are suggested to protect K2 from degradation. Regulatory frameworks differ across regions: EFSA recognizes folate's role in homocysteine metabolism, while vitamin K2 has yet to receive cardiovascular health claims in Europe, though it is approved in the US for arterial health.

The article underscores the importance of life-stage–specific supplementation, particularly for women of reproductive age and postmenopausal women, while cautioning against over-medicalization.

Looking ahead, clinical research, regulatory evolution, and consumer education are expected to drive broader adoption of K2–folate blends in mainstream heart health categories, positioning them as evidence-backed solutions for holistic cardiovascular support.

https://www.nutritioninsight.com/news/vitamin-k-folate-heart-health-risk-gnosis.html

Women's health supplements: Advances in menopause support, probiotics, and metabolic health

The women's health supplements are evolving into a more holistic, science-driven, and lifestyle-oriented category.

Perimenopause is emerging as a significant growth area, with younger women seeking early support for hormonal changes, while postmenopausal women remain a strong consumer base. Clinical trials are increasingly linking microbiome solutions to benefits that extend beyond gut health, including mood regulation, skin hydration, and metabolic balance.

Probiotics and postbiotics are highlighted as central innovations, with strains such as Urex and Astarte supporting vaginal and urogenital health, and Lactobacillus gasseri CP2305 showing promise in reducing stress, anxiety, and menopausal symptoms. Soy isoflavones are also under study for their role in alleviating hot flashes, supporting bone health, and improving skin quality through S-equol production.

Herbal and plant-based actives are gaining traction as alternatives to pharmaceuticals, with black seed oil (ThymoQuin) demonstrating cortisol reduction, mood improvement, and metabolic benefits. Modular and stackable supplement solutions are being developed to address multiple aspects of women's wellness across life stages, incorporating ingredients such as fenugreek extract for libido and muscle strength, saffron extract for mood and sleep, and oleoylethanolamide for metabolic health. Resveratrol has been validated in long-term studies for its effects on cognition, bone health, menopausal symptoms, and skin, positioning it as a next-generation ingredient. Omega-3 concentrates from fish and algae are also emphasized for their role in mood, maternal health, and healthy aging, with innovations in purity and sensory experience making them easier to adopt.

Consumer expectations are shifting toward transparency, clinical validation, and convenience. Functional formats such as gummies, carbonated drinks, chocolate squares, and oral strips are rapidly growing in popularity, especially among younger women, while capsules remain trusted for efficacy. The industry is responding to a cultural shift in which open conversations about menopause, hormonal changes, and women's health are becoming mainstream, amplified by social media and AI-assisted search. This has created a demand for supplements that are not only scientifically credible but also enjoyable, flexible, and tailored to different stages of life.

https://www.nutritioninsight.com/news/womens-health-supplements-market-research-trends.html

Plant synergies for supplements: Study finds anti-inflammatory remedy

A recent Japanese study has uncovered striking synergies between plant-derived compounds that dramatically enhance anti-inflammatory effects.

Capsaicin, the active compound in chili peppers, was identified as the most potent anti-inflammatory agent. When combined with menthol or 1,8-cineole (commonly found in eucalyptus oil), its effectiveness increased by several hundred times. Specifically, the study reported that capsaicin paired with menthol reduced the required concentration by 699-fold, while pairing with 1,8-cineole achieved a 154-fold reduction.

The researchers explained that this synergy arises from the compounds acting through different intracellular pathways. Menthol and 1,8-cineole influence transient receptor potential (TRP) channels and calcium signalling, while capsaicin suppresses inflammation through a separate mechanism. By activating distinct pathways simultaneously, the combinations produced a novel mode of action that amplified anti-inflammatory responses.

The findings are significant because chronic inflammation is a silent driver of many diseases, including cardiovascular disease, type 2 diabetes, obesity, arthritis, and cancer. While many plant-based compounds have shown anti-inflammatory potential, they typically require concentrations far higher than what can be consumed in a normal diet. This study demonstrates that combining phytochemicals can achieve meaningful biological effects at much lower doses, offering new opportunities for functional foods, supplements, and even seasonings or fragrances.

The authors conclude that the health benefits of plant-rich diets may stem not from single ingredients but from the synergistic interactions among multiple compounds. Their work provides molecular-level evidence for the long-observed empirical effects of combining food ingredients and supports dietary strategies that harness phytochemical synergies to control inflammation and prevent disease.
https://www.nutritioninsight.com/news/plant-synergies-inflammation-supplements-nutrition.html

Sugary drinks may spike anxiety in adolescents, UK researchers warn

UK researchers have identified a significant link between sugary drink consumption and adolescent anxiety disorders.

The review, conducted at Bournemouth University and published in the Journal of Human Nutrition and Dietetics, analysed surveys from 2000 to 2025 that tracked both mental health and dietary habits among young people. It found that adolescents who regularly consumed highly sugary beverages—including fizzy drinks, energy drinks, sweetened juices, squashes, flavoured milks, and sweetened teas or coffees—had a 34% higher likelihood of developing anxiety disorders.

The researchers emphasize that while public health initiatives have traditionally focused on the physical consequences of poor diet, such as obesity and type 2 diabetes, the mental health impacts of sugary drinks remain underexplored. Anxiety disorders are already one of the most common mental health conditions among young people, with one in five children estimated to have a mental health disorder in 2023. The findings suggest that reducing sugary drink intake could help mitigate the rising prevalence of adolescent anxiety.

The review also connects this issue to broader evidence on diet and brain health. Artificial sweeteners such as aspartame, saccharin, and erythritol have been linked to cognitive decline, while restricting sugar intake early in life has been shown to lower risks of cardiovascular disease later in adulthood. Other studies have associated ultra-processed food consumption with higher rates of depression.

The authors argue that these findings highlight the need for public health strategies and clinical interventions that address not only the physical but also the psychological consequences of dietary habits.They conclude that reducing sugary drink consumption among adolescents could be a practical step toward improving both mental and physical health outcomes.

https://www.nutritioninsight.com/news/sugary-drinks-anxiety-link-adolescents-study.html

Gut-brain-heart axis: Metabolite may enable diet and probiotic opportunities

Researchers at the Max Delbrück Center in Germany have uncovered a new gut-brain-heart axis involving the metabolite indole-3 acetic acid (IAA), which is derived from the amino acid tryptophan.

Their work shows that IAA influences hypothalamic neurons that regulate heart relaxation and stiffness. In zebrafish models, supplementing with IAA normalized neuronal activity, improved heart function, and restored hormone levels such as renin and angiotensinogen. When IAA levels were low, hypocretin neurons in the hypothalamus became overactive, sending stronger signals to the heart and causing diastolic dysfunction, a condition where the heart struggles to relax properly.

The study also examined human data and found reduced IAA levels in patients with hypertension, with women showing significantly lower levels than men. This sex-specific effect suggests that IAA could serve as a biomarker for identifying individuals at higher risk of hypertension or heart failure.

Since diastolic dysfunction is common in older populations and accounts for more than half of heart failure cases, the findings point to potential therapeutic strategies. Boosting IAA production through diet, probiotics, or supplementation may help prevent or treat cardiovascular disease.

The researchers emphasize that the body's systems are interconnected, with gut health and microbial balance directly influencing heart function via the brain. They conclude that specific dietary or probiotic interventions aimed at increasing IAA could open new avenues for managing cardiovascular health, though further validation in animal models and clinical trials will be necessary.

https://www.nutritioninsight.com/news/gut-brain-heart-axis-iaa.html

Food additives do not disrupt gut microbiome at real doses, lab study finds

A recent study challenges the widespread belief that food additives disrupt the gut microbiome.

Researchers tested eight common additives—including polysorbate 80, carrageenan, carboxymethyl cellulose, allura red, titanium dioxide, potassium sorbate, sodium metabisulfite, and calcium propionate—at realistic consumption levels in a healthy adult. They found no evidence of short-term gut dysbiosis or changes in short-chain fatty acid production, either individually or in combination. This contrasts with earlier studies that used unrealistically high doses, which may have exaggerated potential risks.

The study emphasizes that microbiome resilience depends on individual factors such as baseline composition, genetics, diet, and lifestyle. It also highlights the importance of accounting for intra-individual variability, since gut microbiota naturally fluctuate over time due to diet, stress, and other influences. Misinterpreting these fluctuations can lead to false positives in experiments. While the findings suggest that the gut microbiome may tolerate certain additives at real-world doses, the researchers caution that the study was limited to one participant and should not be generalized without further research.

The authors argue that public discourse often oversimplifies preliminary findings, fuelling misconceptions about additive safety. They stress that dose is fundamental in toxicology and that realistic exposure models are essential for meaningful results. Supporting gut health through established strategies—such as fibre-rich diets and overall diet quality—remains far more impactful than focusing on additive fears. Long-term, population-diverse studies will be needed to confirm whether these results hold across broader groups, but the evidence points toward a more nuanced understanding of how additives interact with the microbiome.

https://www.nutritioninsight.com/news/gut-microbiome-processed-food-additives-myth.html

FOOD SCIENCE & INDUSTRY NEWS

The little-known functional sugar gaining ground across food categories

Trehalose is presented as a functional sugar that is increasingly shaping food reformulation strategies.

It is a disaccharide composed of two glucose molecules and is naturally found in mushrooms, honey, and certain seaweeds. Its unique properties, including stability under heat and acidic conditions, make it valuable in food manufacturing.

Trehalose provides a mild sweetness, about half that of sucrose, and contributes to texture, moisture retention, and shelf-life extension in various products.

The article highlights its role in reformulating foods to reduce sugar content while maintaining desirable sensory qualities. Trehalose is used in baked goods, confectionery, beverages, and frozen foods, where it helps prevent crystallisation, stabilises proteins, and protects cell structures during freezing and drying processes. Its functional benefits extend beyond sweetness, offering versatility in product innovation.

The growing interest in trehalose is linked to consumer demand for healthier options and industry efforts to balance taste, texture, and nutrition in reduced-sugar formulations.

Research continues to explore its potential in enhancing food quality and supporting reformulation strategies, positioning trehalose as a promising ingredient in the evolving landscape of food science and technology.

https://www.foodnavigator-asia.com/Article/2026/02/17/trehalose-the-functional-sugar-shaping-food-reformulation/

Beyond sugar: How sweetener innovation is redefining taste and texture

The food and beverage industry is moving beyond simple sugar-for-sweetener substitutions toward complex, systems-based approaches that rebuild taste, texture, and mouthfeel.

Companies are increasingly blending rare sugars, stevia, citrus flavonoids, fibres, and sweet proteins to replicate sugar's multiple functions, not just its sweetness. Consumer demand is driving this shift, with 72% of people worldwide actively cutting sugar and sweetener innovation growing at 8% annually. Research shows that mixtures of sweeteners are more effective than single ingredients in meeting consumer expectations, with regional preferences shaping product development: freshness in the US, fruity notes in the UK, balanced sweetness in Brazil, and clean labelling in Asia-Pacific.

Regulatory pressures, including sugar taxes in over 120 countries and front-of-pack labelling in more than 40, are accelerating reformulation. The rise of GLP-1 receptor agonists is also influencing preferred sweetness levels and mouthfeel qualities. Allulose illustrates the regulatory patchwork: approved in the US, Japan, South Korea, and Australia/New Zealand, but blocked in the EU after EFSA's 2025 rejection due to insufficient toxicological data. Industry players, including the Allulose Novel Food Consortium, are preparing new safety dossiers while also addressing cost competitiveness through AI-driven formulation tools and blended solutions.

Suppliers are focusing on rebuilding sugar's full functionality. Tate & Lyle combines sweeteners with fibres to replicate bulk and mouthfeel, while HTBA uses citrus-derived flavonoids as taste modulators to mask bitterness and balance flavour. Emerging technologies such as bioconversion and precision fermentation are enabling scalable, high-purity sweeteners with improved taste profiles. Partnerships like Ingredion with Oobli are advancing sweet protein systems, while Samyang is expanding applications beyond beverages into dairy, bakery, and sauces.

The next three to five years are expected to see growth in sweet proteins, advanced stevia blends, rare sugars, and modulators, with sustainability and ingredient transparency becoming central to innovation. Market data shows sucralose still leads in new product development, but monk fruit concentrate is the fastest-growing sweetener, underscoring the dynamic evolution of the category.

https://www.foodingredientsfirst.com/news/sweetener-trends-sugar-reduction-innovation.html

Vivici's precision fermentation-based lactoferrin launches in the US

Vivici has introduced Vivitein LF, a precision fermentation-based lactoferrin ingredient, into the US market, marking a significant milestone in sustainable protein innovation.

Lactoferrin, often called "pink gold," is a rare dairy protein traditionally extracted from cow's milk in very small amounts, making it expensive and difficult to scale. By producing it through microbial fermentation, Vivici is offering a more affordable and environmentally friendly alternative with self-affirmed GRAS status.

Vivitein LF is positioned as a multifunctional protein with broad applications in sports nutrition and wellness. It supports gut health by balancing the microbiome and strengthening the gut barrier, helps manage inflammation linked to exercise, and improves iron absorption—particularly relevant for women with low iron levels who need sustained energy. This launch is Vivici's second precision-fermented protein, following its beta-lactoglobulin (BLG) ingredient, and reflects the company's strategy to expand its global manufacturing footprint and diversify applications across beverages, powders, and bars.

The innovation underscores how precision fermentation can unlock access to bioactives that are otherwise scarce in nature, while reducing reliance on traditional dairy farming. Vivici's entry into lactoferrin also comes amid broader industry momentum: companies like All G, Armor Protéines, 21st.Bio, and Novonesis are developing animal-free versions of bovine and human milk proteins, while others are applying fermentation to produce alternatives to palm oil and herbal compounds.

Together, these advances signal a new era in food technology where rare, high-value bioactives can be scaled sustainably, opening opportunities for functional foods and supplements that deliver targeted health benefits. Vivici will showcase Vivitein LF and BLG at Expo West 2026 in Anaheim, highlighting its ambition to lead in precision-fermented dairy alternatives.

"Pink gold": Vivici's precision fermentation-based lactoferrin launches in the US

Food fortification: Research reveals improved stability of encapsulated vitamin A

The article details a breakthrough in food fortification technology aimed at combating vitamin A deficiency, particularly in West Africa.

Particles for Humanity has developed a patented encapsulated vitamin A palmitate (PFH-VAP) that uses a pharmaceutical-grade coating to protect the nutrient against heat and humidity. This innovation addresses one of the biggest challenges in fortification programs: vitamin A's instability during storage and cooking.

In trials, bouillon cubes fortified with PFH-VAP retained three times more vitamin A after 12 months in high-temperature, high-humidity conditions compared to cubes fortified with commercial alternatives. Bouillon cubes were chosen as a delivery vehicle because they are widely consumed across West Africa, making them an effective medium for reaching populations at risk of deficiency.

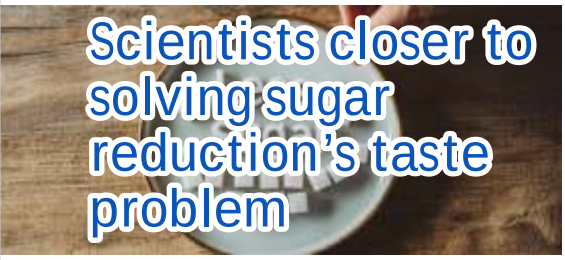
The coating material, basic methacrylate copolymer (BMC), has a long history of safe use in pharmaceuticals and nutraceuticals. By stabilizing vitamin A, PFH-VAP ensures that fortified foods can deliver consistent nutritional benefits even under harsh conditions.

Vitamin A deficiency is a major public health issue in low- and middle-income countries,

linked to impaired child growth, weakened immunity, and vision problems. Fortification is considered one of the most cost-effective strategies to address this, but instability has limited its success. PFH-VAP offers a scalable solution, with commercialization efforts now underway to bring fortified bouillon cubes to market.

This development joins other innovations in vitamin A delivery, such as dry form for infant formula and bioengineered crops like golden rice and golden lettuce. Together, these advances highlight how biotechnology is being leveraged to improve nutrient stability and accessibility in vulnerable populations.

https://www.nutritioninsight.com/news/particles-for-humanity-vitamin-a-food-fortification.html



Scientists closer to solving sugar reduction's taste problem

Scientists are making progress in solving one of the biggest challenges in sugar reduction: preserving taste while lowering sugar content.

Research highlighted in the article shows that advances in food science are enabling the development of sweeteners and formulations that more closely mimic the sensory qualities of sugar, particularly its mouthfeel and lingering sweetness. Traditional sugar substitutes often fall short because they lack the complex flavour profile and functional properties of sugar, leading to consumer dissatisfaction.

The new approaches focus on understanding how sugar interacts with taste receptors and how its molecular structure contributes to flavour perception. By studying these mechanisms, researchers are identifying ways to replicate sugar's sensory effects using combinations of alternative sweeteners, flavour modulators, and texturizing agents. This work is not only about sweetness but also about balancing bitterness, aftertaste, and the overall eating experience.

The implications are significant for the food and beverage industry, which faces mounting regulatory and consumer pressure to reduce sugar levels in products without compromising taste. Successful innovations could help manufacturers meet health guidelines while maintaining consumer acceptance, opening opportunities for reformulated products across categories such as soft drinks, baked goods, and dairy. The research represents a step toward bridging the gap between public health goals and consumer expectations, signalling that sugar reduction may soon be achievable without the trade-offs that have hindered adoption in the past.

Researchers at Tufts University have developed a breakthrough method for producing tagatose, a rare sugar that closely mimics the taste of sucrose but with fewer calories and a lower glycaemic impact. Tagatose naturally occurs in small amounts in dairy and certain fruits, but traditional manufacturing methods have been inefficient and costly.

The new approach uses genetically engineered E. coli bacteria equipped with enzymes, including one derived from slime mould, to convert glucose into tagatose with yields of up to 95 percent—far higher than conventional processes.

Tagatose delivers about 92 percent of the sweetness of table sugar while containing roughly 60 percent fewer calories. It is processed differently in the body, with much of it fermented by gut bacteria rather than absorbed in the small intestine, resulting in smaller spikes in blood glucose and insulin. Beyond metabolic benefits, it may also support oral health by slowing the growth of cavity-causing bacteria and potentially offering probiotic effects.

The innovation addresses the long-standing challenge of sugar reduction without compromising taste. Many existing sweeteners suffer from bitterness, metallic aftertastes, or unusual mouthfeel, but tagatose offers a near-identical sensory profile to sugar.

With FDA recognition as "generally safe," the prospect of scaling production could transform the sweetener industry, enabling food and beverage manufacturers to deliver indulgence with fewer health trade-offs. This advance may also pave the way for efficient biosynthesis of other rare sugars, reshaping the future of sugar alternatives.

https://www.foodnavigator.com/Article/2026/01/29/scientists-closer-to-solving-sugar-reductions-taste-problem/

The 3 nutrients quietly shaping mainstream snacks

Mainstream snacking is undergoing a quiet but significant transformation, driven not by exotic superfoods but by familiar nutrients: fibre, protein, and whole grains.

These ingredients are increasingly being built into everyday products rather than positioned as niche health items, reflecting both consumer demand and regulatory pressure. The shift is subtle—bread, biscuits, and cereals look and taste the same, but they now deliver more fibre or balanced protein, making indulgent snacks easier to justify in daily routines.

Fiber, once overshadowed by protein, is emerging as a commercial priority thanks to growing awareness of gut health, satiety, and long-term wellness. Large-scale studies consistently link higher fibre intake to reduced risk of chronic disease, yet most adults fall short of recommended levels. Brands are responding by reformulating staples with added fibre, sometimes without overt health marketing, as seen in millet-based buns in India.

Protein remains a powerful purchase driver, but its role has broadened beyond sports nutrition to signal fullness and sustained energy for all age groups. The focus has shifted from maximizing protein numbers to achieving balance, blending sources, and improving textures so snacks still feel indulgent.

Whole grains tie these threads together, offering fibre, plant protein, and consumer familiarity. Ancient grains like millet and rye are being used to modernize products with nutritional and provenance appeal. Major companies are reformulating core portfolios with whole grains, incremental fibre, and portion control to keep mainstream brands relevant without repositioning them as overtly health-focused.

This evolution reflects how snacking has replaced meals for many consumers, raising expectations for nutrition and satisfaction. Regulatory scrutiny of sugar, salt, and fat further accelerates reformulation, while trends like GLP-1 weight-loss drugs reinforce the demand for snacks that deliver satiety. The result is a new baseline where better-for-you nutrition is seamlessly integrated into mainstream products, reshaping the snack aisle without changing its familiar look and feel.

https://www.foodnavigator.com/Article/2026/01/21/3-nutrients-driving-the-shift-in-mainstream-snacks/

TikTok's influence on food: How online trends blow up

TikTok has become a powerful driver of food trends, shaping consumer behaviour and even influencing global markets.

The platform's algorithm delivers highly personalized content streams, allowing niche food ideas to gain rapid exposure. Visual appeal plays a central role, with striking aesthetics and emotionally engaging presentations making foods more likely to go viral. Dubai chocolate, with its vivid pistachio-green knafeh and crunchy texture, exemplifies how presentation can spark mass interest.

Creators are another key factor. Younger users often perceive TikTok influencers as authentic and relatable, sometimes forming emotional bonds with them. This sense of trust amplifies the uptake of food trends, as recommendations feel more like peer suggestions than advertising.

The communal nature of TikTok further accelerates growth, with hashtags and challenges encouraging widespread participation and linking users into expanding waves of content.

The impact of these trends is tangible. Dubai chocolate's popularity in 2025 was so intense that it contributed to a global pistachio shortage.

Cottage cheese experienced a surge in demand due to its high protein content and versatility, while freeze-dried candy markets expanded rapidly, with predictions of doubling within a decade.

Even unusual ideas such as butter boards gained traction through TikTok. Established brands like Little Moons and Itsu have also benefited from the platform's influence, achieving significant success through viral exposure.

Researchers are now examining how TikTok shapes dietary preferences and consumption patterns, given its ability to transform food culture at scale. The platform's influence is undeniable, with trends originating there capable of moving markets. Yet, with ongoing debates about its ownership and calls for boycotts, questions remain about whether this level of influence will endure.

https://www.foodnavigator-asia.com/Article/2026/01/29/tiktok-food-trends-how-they-blow-up/

Chocolate without cacao, cultured meat: Japan focuses on 'food tech' amid high prices

Japan is turning to food technology as a way to address rising food prices and supply instability caused by climate change, global crises, and market speculation.

Chocolate has become emblematic of this challenge, with prices climbing sharply since 2023 due to reduced cacao harvests in West Africa, where land grabs, abnormal weather, and disease have disrupted production. Similar pressures are affecting coffee and oranges, leading to what researchers call the "coffee 2050 problem" and the "orange crisis."

In response, Japanese companies and researchers are developing alternatives. Aeon Co. introduced "Chococa?" in 2025, a chocolate substitute made from sunflower seeds using ChoViva technology developed by Germany's Planet A Foods. The product mimics the taste and texture of chocolate while offering a more stable supply chain and lower environmental impact, since it avoids deforestation and reduces transport distances.

Other innovations include fungal meat, cultivated from koji mould by startup Koji Labo, which reduces emissions and water use while upcycling by-products from sake and shochu production.

Research into cellular foods is also advancing, with projects cultivating cow muscle and fat cells to create cultured beef, and efforts to replicate eel meat by combining fat-producing cells with muscle tissue. These technologies aim to replicate the flavour, texture, and nutritional qualities of traditional foods while addressing sustainability concerns.

Food tech has gained national importance in Japan, designated in 2025 as one of 17 strategic areas for economic growth. With startups emerging and universities deepening their research, momentum is building toward a future where alternatives like sunflower-based chocolate, fungal meat, and cultured seafood could become mainstream solutions to global food crises.

https://mainichi.jp/english/articles/20260128/p2a/00m/0sc/013000c

Is Hybrid Dairy the Bridge Plant-Based Milk Needs?

Hybrid dairy is emerging as a potential bridge between traditional cow's milk and plant-based alternatives, aiming to balance sustainability, nutrition, taste, and affordability.

Conventional dairy remains environmentally costly, accounting for around 4% of global greenhouse gas emissions, while plant-based milks, though far less damaging, often struggle with taste, texture, protein content, and price. Sales data reflects this tension: dairy milk consumption has recently risen, while plant-based milk sales have declined.

Hybrid dairy blends animal milk with plant-based ingredients to combine the familiarity and protein of dairy with the lower environmental footprint and health benefits of plants. Consumer surveys show mixed reactions: while many are hesitant about hybrid beverages, interest is stronger in formats like yoghurt, cheese, and ice cream. Millennials and Gen Z are particularly open to trying these products, with coconut and cashew ingredients seen as especially appealing.

Several companies have experimented with hybrids. Past attempts by Arla, Triballat Noyal, and Kerry's Smug Dairy struggled due to poor marketing, pricing, or limited sustainability gains.

However, newer ventures like Danone's Dairy & Plants Blend and PlanetDairy's collaborations with Dutch retailer Albert Heijn have found success by hitting the right balance of plant-to-dairy ratios, lowering emissions by 20–30%, and even pricing products slightly below conventional dairy.

The challenges remain significant. Products must deliver clear climate benefits, competitive pricing, and strong taste to win over consumers. Labelling and positioning are also critical, as hybrids can be perceived as confusing or unnecessary. Yet with growing investment from players like Ikea's VC arm and innovations such as sunflower-seed fats or cell-cultured milk components, hybrid dairy is gaining traction.

As precision fermentation and fully plant-based proteins scale up, hybrid dairy may serve as a near-term solution, offering a pragmatic step toward reducing dairy's environmental impact while maintaining consumer acceptance.

https://www.greenqueen.com.hk/hybrid-dairy-plant-based-milk-blended-protein-trend/

Leading UK Chocolate Supplier Embraces Cocoa-Free Alternatives

A leading UK confectionery supplier, Keylink, has entered into an exclusive partnership with London-based food tech startup Win-Win to distribute cocoa-free chocolate alternatives.

This marks a significant step in the growing shift toward climate-friendly chocolate solutions, as the industry grapples with soaring cocoa prices, supply shortages, and environmental concerns.

Win-Win's products are made using carob combined with fermented rice, sunflower seeds, shea, and RSPO-certified palm oil. The startup employs traditional chocolate-making techniques—fermentation, roasting, grinding, refining, and tempering—to replicate the taste, texture, and appearance of conventional chocolate. Its range includes dark, milk, vegan milk, and white chocolates that can be tempered and baked like standard couverture, making them suitable for cookies, cakes, pastries, ice cream, and desserts.

The partnership comes at a time when cocoa stocks are at their lowest in a decade, with extreme weather and crop diseases devastating plantations in Ivory Coast and Ghana. Scientists warn that a third of the world's cocoa trees could die out by 2050. Chocolate production itself is highly resource-intensive, requiring around 1,700 litres of water per bar and generating more greenhouse gas emissions than any food except beef. Win-Win's alternatives use up to 80% less water and produce 82% fewer emissions.

Keylink will now stock Win-Win's cocoa-free chocolates in formats such as EasymeltChiips and Bakestable drops, available in 10kg bags, with a promotional discount offered until July 31, 2026. This is Win-Win's second major distribution deal in Europe, following its collaboration with Martin Braun-Gruppe in Germany. Its products have already appeared in London bakeries, bars, and Michelin Green Star restaurants.

The move reflects a broader industry trend, with major players investing in cocoa-free or cell-based chocolate startups. As climate pressures intensify, cocoa-free alternatives are increasingly seen as a sustainable path forward for the chocolate industry.

https://www.greenqueen.com.hk/keylink-cocoa-free-chocolate-alternative-win-win/

The future of chocolate is bittersweet

The future of chocolate is being reshaped by persistently high cocoa prices and fragile supply chains, creating both challenges and opportunities for the industry.

Cocoa futures surged to nearly $13,000 per metric ton in late 2024 before settling at $5,000–$6,000 in early 2026—still far above historical norms. This structural cost increase is forcing manufacturers to rethink formulations across confectionery, bakery, snacks, ice cream, and beverages, where chocolate is a key ingredient.

Rather than a single dramatic pivot, companies are making incremental adjustments: reducing cocoa content, substituting fats, and relying more on flavour systems to replicate chocolate's sensory cues. Cocoa butter alternatives such as palm fractions, shea, sal, and illipe fats are now central to strategy, providing functional properties like crystallization and firmness even if they cannot fully replicate cocoa butter's snap or melt. Flavour systems are increasingly used to rebuild chocolate aroma and taste when cocoa solids are reduced.

At the same time, startups offering cocoa-free or cell-based chocolate are gaining traction, moving from contingency options to serious consideration. Fermented ingredients and bioreactor-grown cacao cells remain speculative but signal how exposed the industry feels to climate and supply risks. Côte d'Ivoire and Ghana, which dominate global cocoa supply, face worsening disease pressure, climate volatility, and demographic challenges as older farmers retire with fewer younger replacements.

Consumer demand, however, remains stubbornly strong. Chocolate continues to be one of the last indulgences people are willing to give up, even amid inflation and shrinkflation. This creates tension: manufacturers must balance rising costs with consumer expectations of affordability and authenticity. Reformulation risks consumer mistrust if not communicated transparently, especially as definitions of "chocolate" vary across markets and scrutiny of ultra-processed foods grows.

Ultimately, chocolate's future will depend less on nostalgia and more on how the industry manages price, supply security, and transparency. Alternatives and hybrids are becoming part of mainstream strategy, but success will hinge on how clearly companies explain these changes and maintain consumer trust.

https://www.foodnavigator-asia.com/Article/2026/02/10/the-bittersweet-future-of-chocolate-as-cocoa-prices-surge/

GLP-1 foods in Asia: State of the market and key challenges

The Asian market for GLP-1 companion foods is still in its early stages, shaped by the limited penetration of GLP-1 agonist drugs such as semaglutide and tirzepatide.

While these medications have become mainstream in the United States for diabetes and weight loss, their uptake in Asia remains constrained by high costs, limited accessibility, and concerns over side effects. In the US, insurance coverage and pharmacy availability have made GLP-1 drugs more accessible, but in Asia they are still largely confined to hospitals and clinics, with monthly costs ranging from hundreds to over a thousand dollars.

The introduction of oral GLP-1 pills, such as Wegovy, could change this dynamic by lowering costs and improving convenience. Patent expirations in China and India are also expected to drive down prices through the rise of generics and biosimilars, potentially opening the door to mass adoption. China has already added GLP-1 drugs to its National Drug Reimbursement List for diabetes, and local firms are developing weight-loss-specific versions. India is poised for rapid expansion once patents expire in 2026, with local manufacturers preparing to scale production.

Despite these opportunities, challenges remain. Side effects and rebound weight gain after discontinuation are major concerns, particularly in cultures where slimness is closely tied to beauty standards. Economic realities also limit access, as even reduced prices may represent a significant portion of monthly income for many workers in India and other Asian markets. Broader risks, including potential links to thyroid tumours and organ complications, add to consumer hesitation.

For GLP-1 companion foods to succeed in Asia, companies must address affordability, efficacy, and long-term access while building consumer trust. Innovation, such as drugs requiring less frequent administration, could help overcome barriers. Ultimately, the growth of GLP-1 foods in Asia will depend on how quickly the drugs themselves transition from niche diabetes treatments to widely accepted weight-loss solutions, supported by transparent science and credible assurances of safety and accessibility.

https://www.foodnavigator-asia.com/Article/2026/02/11/glp-1-foods-in-asia/

From comfort to function: How snacking is being redefined

Snacking has undergone a significant transformation, shifting from its mid-20th century identity as greasy, salty indulgence to a modern practice that emphasizes nutrition, functionality, and cultural heritage.

Contemporary consumers are increasingly mindful of how snacks affect energy, blood sugar, and overall wellness, demanding products that deliver protein, fibre, and clean-label ingredients without unnecessary additives.

This evolution is shaping branding strategies, as companies highlight functional benefits and cultural authenticity to build trust and loyalty. Heritage foods, particularly those involving fermentation such as tempeh, kimchi, kombucha, and millet, are being adapted into convenient formats that resonate with today's health-conscious audience. Tempeh chips, for example, combine tradition with modern nutritional appeal, offering protein, vitamin D, and calcium in a snack form that challenges conventional perceptions.

While acceptance varies across regions, with Western consumers more open to functional alternatives and Southeast Asian markets needing education to elevate tempeh's perceived value, the broader trend is clear: snacks are no longer defined solely by taste but by their ability to integrate meaningfully into daily routines, support well-being, and honour cultural roots. This redefinition positions functional heritage-based snacks as central to the future of everyday eating.

https://www.nutraingredients.com/Article/2026/02/16/how-snacking-is-being-redefined/

Food-tech tackles today's threats, but creates new challenges

The rapid advances in food technology are simultaneously solving pressing challenges and creating new complexities for consumer-packaged goods (CPG) companies.

AI Integration: Artificial intelligence is reshaping grocery pricing, supply chain management, and product discovery. Tools like Algolia's Intelligent Grocery Solution and Aera Technology's decision intelligence are helping brands such as Hershey, Mars, and Kraft Heinz anticipate disruptions and optimize operations.

Alternative Proteins: Biotech innovations in cultivated meat and fermentation offer sustainable protein solutions but face regulatory hurdles and shifting investor priorities. Funding is increasingly directed toward scalable, bankable projects rather than early-stage science.

Plant-Based Reset: While plant-based meat sales are slowing, the sector is not collapsing. Adjustments in pricing, manufacturing efficiency, and foodservice distribution are seen as critical for long-term viability.

Regulatory Divergence: Cultivated meat commercialization is influenced by differing national policies, creating uneven timelines and competitive landscapes across countries.

Consumer Discovery & Marketing: AI-driven commerce is changing how consumers find and buy products, requiring CPG brands to restructure product data and APIs to remain visible in agentic commerce ecosystems.

Broader Implications
Food-tech is positioned as both a risk mitigator—helping companies address climate change, supply chain shocks, and economic pressures—and a strategic disruptor, introducing new challenges around regulation, data integration, and competitive differentiation.

These developments as part of a larger transformation in the food system, where innovation is essential for sustainability and resilience but must be carefully managed to avoid unintended risks.

https://www.foodnavigator-usa.com/Article/2026/02/18/food-tech-reshapes-cpg-strategy-and-risk/

At what point does 'transparency' become operational chaos?

The article explores the challenges food and beverage companies face when striving for ingredient transparency while managing operational complexity.

It highlights how consumer demand for clean labels and full disclosure of product contents has grown significantly, pushing brands to provide detailed information about sourcing, processing, and formulation. However, the pursuit of transparency often collides with practical realities such as supply chain variability, regulatory differences across markets, and the sheer volume of data required to track and communicate every ingredient detail.

The discussion emphasizes that while transparency builds consumer trust and aligns with modern values of health and sustainability, it can also create logistical burdens. Companies must balance the desire to disclose information with the need to maintain efficiency, consistency, and clarity in their operations. Too much detail risks overwhelming consumers or creating confusion, while too little risks eroding trust.

The article underscores that ingredient transparency is not simply a marketing choice but an operational challenge that requires careful strategy. It involves coordination across suppliers, manufacturers, and regulators, as well as investment in systems that can manage complex data flows. Ultimately, the piece frames transparency as both a competitive advantage and a potential source of chaos if not managed thoughtfully.

https://www.foodnavigator-usa.com/Article/2026/02/25/when-does-ingredient-transparency-become-operational-chaos/

Mars, Mondelez, Nestlé, Hershey, and Lindt team up to transform future of cocoa

Mars, Mondelez, Nestlé, Hershey, and Lindt have announced the creation of TogetherCocoa, a foundation designed to support cocoa-growing communities and strengthen the resilience of global cocoa supply chains.

The initiative builds on existing sustainability programs but represents a coordinated effort to close the living income gap for cocoa-farming households in Côte d'Ivoire and Ghana. The companies are working with governments, supply-chain partners, and stakeholders across the cocoa sector to ensure long-term impact.

TogetherCocoa is positioned as a response to challenges facing the cocoa industry, including economic volatility, climate pressures, and human-rights concerns.

By pooling resources, the confectionery giants aim to provide more effective support than individual programs could achieve.

The foundation's progress and impact will be shared as details develop, and its launch is seen as a potential turning point in how collaboration, rather than competition, might shape the future of cocoa.

https://www.foodnavigator-asia.com/Article/2026/02/24/mars-mondelez-nestle-hershey-and-lindt-team-up-to-protect-cocoa-and-support-growers/

Does plant-based meat still dominate the meat-free sector?

Plant based meat remains the dominant segment within the meat free sector, despite recent declines and challenges faced by major brands.

After a surge in popularity during the 2010s, the category has experienced setbacks, including product removals from restaurant menus and renewed consumer interest in traditional meat. Nevertheless, market forecasts project strong long term growth. Market Research Future estimates a compound annual growth rate of 15.56% for plant based meat between 2025 and 2035, with Asia Pacific driving much of the expansion due to health and sustainability concerns.

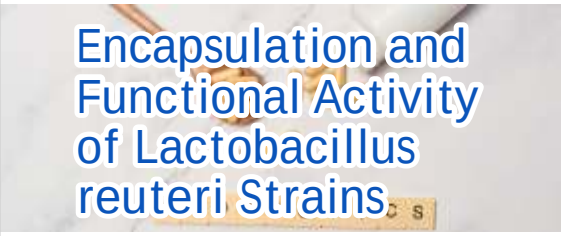
By comparison, tofu is projected to grow at a CAGR of 4.2% and tempeh at 14.75% over the same period.

While traditional plant based foods such as tofu, tempeh, and seitan are culturally established and not perceived as ultra processed, they remain minority choices among consumers. Data from the Good Food Institute (GFI) shows that in the UK, plant based meat sales are more than five times higher than non analogue vegan options like bean burgers or nut roasts, with taste familiarity cited as a key driver.

Market share shifts are occurring, however. Between January 2023 and 2025, plant based meat's share in the UK fell by 2%, while tofu's share rose from 8.3% to 10.8%. Tempeh is also gaining traction, supported by sustainability perceptions. Globally, plant based food overall is forecast to grow at a CAGR of 12% between 2026 and 2036, with clean label innovation expected to be a major driver.

Scratch cooking trends are contributing to renewed growth in plant based categories. In UK supermarkets, sales of plant based foods rose by 1.7% at the end of 2025, with plant based mince up nearly 25% at Tesco, tofu, tempeh, and seitan up 12%, and plant based snacking products such as falafels up 5%. This indicates that while plant based meat continues to dominate, traditional plant based foods are gradually expanding their presence within the sector.

https://www.foodnavigator-asia.com/Article/2026/02/24/meat-alternatives-vs-plant-based-foods-what-do-consumers-prefer/



Encapsulation and Functional Activity of Lactobacillus reuteri Strains

The review article focuses on the encapsulation and functional activity of *Limosilactobacillusreuteri* strains, highlighting their health benefits, technological challenges, and advances in probiotic delivery systems.

It explains that *L. reuteri* has been widely studied for its immunomodulatory, antimicrobial, anti-inflammatory, antioxidant, and metabolic properties, but its viability during food processing and gastrointestinal transit is highly strain-dependent and sensitive to environmental stress. Encapsulation is presented as a key strategy to preserve cellular integrity and functionality, with methods such as ionic gelation, extrusion, electrospray, emulsification, spray drying, and coacervation being explored using biopolymers like alginate, pectin, proteins, starch, and polysaccharides. The article emphasizes that encapsulation efficiency, release kinetics, and functional outcomes vary depending on strain characteristics, coating materials, and processing methods.

It provides integrative comparisons of encapsulation strategies, showing how multilayer coatings, protein–polysaccharide complexes, and nanoparticle-reinforced matrices improve survival under gastric and intestinal conditions, storage stability, and stress tolerance. Functional activities such as antimicrobial effects through reuterin production, anti-inflammatory modulation of cytokines, antioxidant activity via bioactive metabolites, and anti-obesity potential in animal models are discussed, with encapsulation shown to enhance their preservation and delivery.

Strain-specific differences are highlighted, with isolates such as DSM 17938, DSM 20016, ATCC 55730, and NCIMB 30242 demonstrating varied tolerance to acid and bile, adhesion capacity, cholesterol reduction, and antimicrobial activity. The review notes that encapsulation design must align with strain physiology to achieve optimal performance. Industrial scaling remains a challenge, as methods like spray drying and ionic gelation are cost-effective and widely used but require optimization to maintain viability, while emerging techniques like electro-spraying offer precision but face scalability issues.

Overall, the article concludes that encapsulation is essential for translating the functional potential of *L. reuteri* into viable food and therapeutic applications. Future research should focus on integrating strain-specific traits with encapsulation strategies, improving stability under industrial conditions, and validating health claims within regulatory frameworks to support the development of functional foods and nutraceuticals containing *L. reuteri*.
https://ift.onlinelibrary.wiley.com/doi/10.1111/1541-4337.70412

FSSAI's 2026 Amendment to the Licensing and Registration of Food Businesses Regulations

The Food Safety and Standards (Licensing and Registration of Food Businesses) Amendment Regulations, 2026, represent a major reform in India's food safety framework.

These amendments revise the definition of petty food business operators to explicitly include street vendors, hawkers, food trucks, and small-scale food businesses. Registration processes have been simplified, with provisions for instant grant of registration certificates upon submission of required documents. Vendors already registered under the Street Vendors Act, 2014, are automatically deemed registered under FSSAI, reducing duplication and easing compliance.

The regulations introduce risk-based inspection and audit mechanisms, allowing authorities to determine inspection frequency based on risk level, compliance history, and business type. This approach ensures that higher-risk businesses receive closer scrutiny while reducing unnecessary burdens on compliant operators.

License validity has been clarified, with indefinite validity subject to suspension in cases of non-payment or non-compliance, and mandatory surrender upon business closure.

Overall, these changes strengthen oversight while improving the ease of doing business. They balance consumer safety with regulatory efficiency, ensuring that food businesses, from small vendors to larger manufacturers, operate under a streamlined and transparent compliance framework.

https://cliniexperts.com/regulatory-update/food-safety-and-standards-licensing-and-registration-of-food-businesses-amendment-regulations-2026/

Delay in FSSAI finalising front of pack labelling rules unusual by its own norm

The Food Safety and Standards Authority of India has faced unusual delays in finalising front-of-pack labelling regulations, a process that has now stretched over a decade compared to its usual two-year timeframe for framing or amending regulations.

Initial guidelines were issued in 2014, followed by a draft regulation in 2018, but despite multiple stakeholder consultations and revised drafts, no regulation has been implemented.

The matter is currently under the scrutiny of the Supreme Court, which is monitoring progress in response to a public interest petition demanding mandatory labelling of high fat, sugar, and salt content in packaged foods.

The procedures outlined under FSSA involve several stages, beginning with drafting amendments after consultations, review by scientific panels and committees, approval by the Authority, subsequent clearance from the health ministry and placement before Parliament.

Whether the regulation is in draft or final form, it must undergo legal vetting and be gazette-notified as part of the procedure.

This mandated procedure is subject to timelines of the various stages and is unlikely to be enacted soon.

https://timesofindia.indiatimes.com/business/india-business/delay-in-fssai-finalising-front-of-pack-labelling-rules-unusual-by-its-own-norm/articleshowprint/129802711.cms

FSSAI makes food business permits permanent

The Food Safety and Standards Authority of India (FSSAI) has introduced a major reform by making food business licences and registrations valid permanently, eliminating the need for periodic renewals.

This change is designed to ease compliance for lakhs of restaurants, eateries, and vendors, while ensuring that food safety standards remain stringent. Street vendors stand to benefit significantly, as those registered under the street vending law will automatically be recognized under food safety rules, reducing duplication of paperwork and fees. The classification of businesses has also been simplified: units with turnover up to Rs 1.5 crore will require only basic registration, while larger businesses will need state or central licences depending on their scale.

Beginning April 1, inspections will follow a risk-based model, with businesses maintaining good records facing fewer checks, while repeat violators will be scrutinized more closely. Despite the relaxation in licensing procedures, FSSAI has emphasized that hygiene standards, particularly in high-risk sectors such as dairy, meat, and packaged water, will not be diluted.

The responsibility for monitoring and enforcement will largely shift to state authorities, signalling a stronger role for them in safeguarding food safety. Overall, the initiative promises reduced bureaucratic hurdles for small businesses and vendors, balanced by stricter enforcement against non-compliance.

https://timesofindia.indiatimes.com/india/fssai-makes-food-business-permits-permanent/articleshow/129872051.cms

Australia may mandate health star ratings on packaged foods as voluntary measures fail

Australia is preparing to propose mandatory health star ratings on packaged foods at the upcoming Food Ministers Meeting, after the voluntary system failed to meet its targets.

In 2020, ministers set a threshold of 70% uptake by 2025, but current data from Food Standards Australia New Zealand shows only 37% of products display the rating, down from 41% in 2019. The government argues that mandatory labelling would enhance consumer choice, simplify decision-making, and create a fairer environment for producers. Assistant Minister Rebecca White emphasized that many Australians want to make healthier choices but lack the time to analyse detailed nutrition tables, making front-of-pack ratings a practical solution.

The health star rating system is designed as a basic guide to help shoppers quickly compare products on supermarket shelves. By requiring all packaged foods to carry the rating, the government hopes to ensure consistency and transparency across the market. The proposal also includes ongoing monitoring of how ratings are calculated, with adjustments to be made if necessary. While Australia positions mandatory ratings as a public health initiative, international evidence is mixed.

A US study found no significant impact of front-of-pack labels on food intake, diet quality, or obesity rates, raising questions about how effective such measures may be in changing long-term dietary behaviour. The upcoming meeting will determine whether the ratings become compulsory and outline steps for implementation.

https://www.nutritioninsight.com/news/australia-mandatory-health-star-ratings-proposal.html

Food industry calls for nutrient-based approach to ultra-processed foods

The 2025–2030 Dietary Guidelines for Americans advise limiting processed foods but fail to define them, which risks confusing consumers and encouraging overly broad regulatory responses.

Rocco Renaldi of the International Food and Beverage Alliance argues that classifications such as the Nova system oversimplify nutrition

by focusing on the level of processing rather than the actual nutrient profile of foods. This approach can group nutritionally distinct products together, such as whole-grain bread and refined white bread, or ignore reformulated products that have reduced salt, sugar, or fat content while adding beneficial nutrients.

Renaldi highlights that vague guidance may lead consumers to assume all packaged foods are unhealthy, despite many being fortified or reformulated to address nutrient gaps affordably. From a policy standpoint, this lack of clarity risks blunt regulatory measures that fail to distinguish between foods that contribute positively to diets and those that do not.

He warns that such framing could discourage consumer engagement and reduce incentives for manufacturers to continue improving nutritional quality. Fortified and reformulated foods, he stresses, should be evaluated on their nutritional composition rather than dismissed for being processed, as they play a vital role in addressing deficiencies such as fibre intake.

The article also underscores that industry reformulation efforts over the past decade have achieved measurable reductions in nutrients of concern while enhancing positive nutrients, though these changes are often gradual to ensure consumer acceptance. Guidelines that overlook these efforts present an incomplete picture of the food system and risk undermining progress.

Broader industry voices, including ACI Group and Specialised Nutrition Europe, emphasize that processing is not inherently negative and is often essential for improving access to safe, affordable, and nutritious foods. The debate ultimately reflects the need for dietary guidance that balances clarity, nuance, and recognition of ongoing innovation in food formulation.

https://www.nutritioninsight.com/news/processed-foods-guidelines-nova-ifba.html

UN FAO and EFSA collaboration to strengthen food safety and regulatory science

The European Food Safety Authority (EFSA) and the UN Food and Agriculture Organization (FAO) have signed a three year Memorandum of Understanding to strengthen cooperation on food safety and regulatory science.

The agreement emphasizes science based solutions for safe, sustainable, and resilient food systems, with a focus on emerging areas such as novel foods, biotechnology, artificial intelligence, and microbiome research.

The partnership is built on the "One Health" approach, integrating human, animal, plant, and environmental health to address food safety challenges holistically. EFSA's executive director Nicolaus Kritz and FAO's chief economist Maximo Torero Cullen signed the MoU in Rome, highlighting the importance of combining expertise to prepare for future risks and opportunities in food governance.

The collaboration will also advance work on Codex Alimentarius, the global standards for food safety, and support innovation while maintaining rigorous public health protections.

Industry voices have welcomed the agreement as a framework that can unlock opportunities for bio-solutions and sustainable practices, aligning with the rapid evolution of science and technology in food systems.

https://www.foodingredientsfirst.com/news/un-fao-and-efsa-collaboration-to-strengthen-food-safety-and-regulatory-science.html

US FDA approval boosts Amai Proteins' sugar substitute commercialization

Amai Proteins has achieved a significant milestone with the US FDA granting GRAS (Generally Recognized as Safe) status for its sweet protein Sweelin, paving the way for commercialization in the United States.

Sweelin is a monellin-based protein, inspired by the serendipity berry, and is approximately 3,000 times sweeter than sugar by weight. Instead of extraction from fruit, Amai Proteins uses its proprietary Pro3 technology platform, which combines computational protein design, precision fermentation, and food technology to produce scalable, high-performance sweet proteins.

The FDA's approval confirms no safety concerns for Sweelin's use as a general sweetener, allowing food and beverage manufacturers to incorporate it into product trials and commercial launches with reduced regulatory friction. The company is already conducting trials across categories such as high-protein ready-to-drink beverages, chocolate, and functional nutrition formats, focusing on sweetness equivalence, sensory optimization, and stability under manufacturing conditions.

Sweelin is positioned as a clean-label, protein-based alternative to conventional sweeteners, aligning with consumer demand for sugar reduction and protein-rich products, particularly in the context of GLP-1-driven dietary trends.

Amai Proteins emphasizes that Sweelin performs best within balanced sweetener systems, complementing other sugar-reduction strategies like stevia blends, rare sugars, and taste modulators. The ingredient also offers cost advantages, as precision fermentation enables yield improvements and process optimization over time. Legal counsel has confirmed that manufacturers can label Sweelin as "Serendipity Berry Sweet Protein," supporting transparent and simple ingredient lists.

https://www.foodingredientsfirst.com/news/us-fda-approval-boosts-amai-proteins-sugar-substitute-commercialization.html

Scientists urge US FDA to rethink nutrition labelling as literacy gap may undermine health goals

The new research examining the effectiveness of the US FDA's proposed Nutrition Info Box, a front of package label intended to highlight saturated fat, sodium, and added sugars.

The study, published in the American Journal of Preventive Medicine, found that while the label improves understanding among consumers with higher nutrition literacy, it widens the gap for those with lower literacy. In contrast, simpler spectrum style labels, which rate foods from least to most healthy, were easier to interpret across all literacy levels and more likely to influence healthier purchasing decisions.

The randomized trial involved over 5,000 participants from diverse backgrounds, all of whom were primary grocery shoppers. Results showed that the Nutrition Info Box was most effective for those already skilled at interpreting nutrition information, while spectrum labels provided clearer guidance for everyone.

Researchers emphasized that although all tested labels improved consumer understanding compared to current systems, only spectrum labels consistently prompted healthier choices.

Experts, including Jason Block of Harvard Medical School, urged the FDA to reconsider its approach. They suggested either pairing the Nutrition Info Box with extensive consumer education or adopting a simpler design to avoid exacerbating health disparities.

The findings highlight the tension between providing detailed nutritional data and ensuring accessibility, underscoring the importance of designing labelling systems that both inform and empower consumers to make healthier decisions.

https://www.nutritioninsight.com/news/nutrition-literacy-gap-fda-labeling.html

US FDA to reassess safety of food preservative BHA after cancer concerns

The US FDA has decided to reassess the safety of butylated hydroxyanisole (BHA), a synthetic preservative long used in foods such as cereals, cookies, candy, meat products, and frozen meals.

This move comes after decades of concern from health advocates and the National Toxicology Program, which classified BHA as "reasonably anticipated to be a human carcinogen" based on animal studies. The reassessment signals a broader tightening of oversight under the GRAS (generally recognized as safe) framework, which has allowed BHA to remain in the food supply since its approval in 1961.

FDA officials emphasize that the review reflects a proactive approach to food safety, aiming to ensure that chemical additives meet modern

The agency has indicated that butylated hydroxytoluene (BHT), another synthetic preservative, will likely undergo similar scrutiny.

Reform of the GRAS system is central to this effort, with the FDA seeking greater transparency and oversight of chemical reviews, including food contact substances and colour additives.

The initiative marks a shift away from reliance on outdated approvals and toward continuous post-market evaluation of additives. Officials stress that if BHA fails to meet current safety standards, it will be removed from the food supply, underscoring a commitment to rigorous, science-based regulation and heightened consumer protection.

https://www.nutritioninsight.com/news/fda-bha-preservative-safety-reassessment-review.html

Food and beverage manufacturers scramble to reformulate as FDA tightens "healthy" definition

The FDA's updated definition of "healthy" is creating significant pressure on US food and beverage manufacturers, with full compliance required by 2028.

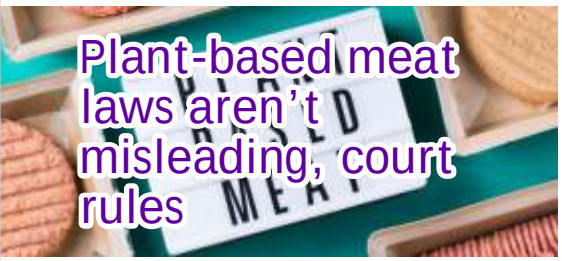
The new rules impose strict limits on sugar, sodium, and saturated fat, forcing companies to reformulate products that previously carried "healthy" claims. While the technical challenges of reformulation are considerable, the bigger risks lie in supply chain constraints and rising costs. Specialty fibres, potassium-based salt substitutes, alternative fats, and concentrated whole food ingredients are in high demand, but global sourcing difficulties, tariffs, and price volatility are making them harder to secure.

Industry experts warn that early movers are gaining leverage by locking in suppliers and stabilizing costs, while late adopters face higher premiums, longer lead times, and fewer compliant options. Categories most exposed include processed snacks, frozen meals, breakfast cereals, flavoured yogurts, baked goods, and certain beverages, all of which rely heavily on added sugars, sodium, or fats for taste and shelf life.

From a regulatory standpoint, delaying reformulation increases the risk of noncompliance, potential penalties, and loss of market share. Companies are advised to conduct immediate portfolio audits to identify products making "healthy" claims, verify nutrient content, and begin supplier validation. Reformulation must be paired with updated packaging, labelling, and marketing materials to align with the new standards.

The FDA's move is part of a broader effort to tighten oversight of nutrition claims, and while it poses short-term challenges, it also opens opportunities for innovation. Manufacturers that adapt quickly can position themselves as leaders in healthier product development, capturing consumer trust and market share in a shifting regulatory landscape.

https://www.nutritioninsight.com/news/fda-food-beverage-reformulations-supply-chain-shortages.html



Plant-based meat laws aren't misleading, court rules

A federal court in Texas has struck down a state law that required plant-based meat products to carry disclaimers such as "does not contain meat."

The ruling, delivered on January 28, 2026, by District Judge Robert Pitman, found that the law violated the First Amendment and that terms like "veggie burgers" or "veggie bacon" are not misleading to consumers. Survey evidence presented in the case showed that shoppers could accurately distinguish between plant-based and animal-based products, with accuracy rates of 96% and 97% respectively. In fact, the mandated disclaimers increased confusion in some cases, rather than reducing it.

The lawsuit was brought by the Animal Legal Defence Fund on behalf of Tofurkey and the Plant Based Foods Association, continuing a string of victories against similar laws in Arkansas, Louisiana, Oklahoma, and Missouri. The court emphasized that Texas had failed to provide evidence of consumer confusion and had never received complaints about plant-based labelling.

Advocates argue that the law was designed to protect the state's meat industry rather than consumers, and the decision is seen as levelling the playing field for plant-based producers. Industry groups like the Good Food Institute welcomed the ruling, noting that consumers have never been misled by plant-based meat labels and that the law attempted to solve a non-existent problem at the expense of free speech and consumer choice.

A parallel debate continues over plant-based milk labelling. While the FDA has considered stricter requirements, including nutritional comparisons on packaging, regulators have acknowledged that consumers understand terms like "soy milk" or "oat milk" and are intentionally choosing them as alternatives to dairy. The broader legislative battle, including the Dairy Pride Act introduced in 2025, reflects ongoing tensions between traditional animal agriculture and the growing plant-based sector.

https://www.foodnavigator-usa.com/Article/2026/02/03/texas-court-blocks-plant-based-meat-labeling-law/

Clearer and more flexible: India's 2026 alcohol regulations

India's updated alcohol regulations, set to take effect on July 1, 2026, mark a significant shift toward greater transparency for consumers and more flexibility for producers.

Proposed between June and November 2025, the changes align with the Food Safety and Standards Authority of India's (FSSAI) broader push to empower consumers while clarifying compliance requirements for manufacturers.

One of the most notable updates is the introduction of mandatory labelling of standard drinks. Brands must now display the approximate number of standard drinks per package, rounded to one decimal place, based on the definition of one standard drink as 10g of pure alcohol.

This move is intended to help consumers track intake more easily and encourage mindful consumption.

The regulations also expand category definitions. Ready-to-drink alcoholic beverages will replace the "low-alcohol" category, covering products between 0.5% and 15% ABV, reflecting the growth of flavoured and mixed drinks.

Craft beer provisions now include nitro beers, while the wine category has been broadened to encompass honey mead, grain-based wines, and wine-based beverages with alcohol content ranging from 4% to 15.5%.

Importantly, "Indian liquor" has been formally defined, bringing domestically produced spirits under clearer national standards and bridging gaps between food safety and state excise laws.

Technical parameters have also been adjusted. The permissible level of esters in alcoholic beverages has been raised from 0.2 g/L to 3.0 g/L, allowing for greater flavour complexity.

Sparkling wines labelled Brut will now have a sugar tolerance of ±0.3%, reducing the risk of false non-compliance due to natural fluctuations or testing variability.

These changes are designed to improve enforceability, reduce unnecessary industry pushback, and support innovation by allowing reasonable compositional variation.

By moving the enforcement date to July 1, FSSAI has also accommodated industry concerns about aligning with the excise year, minimizing disruption and costs associated with label re-registration.

Overall, the 2026 regulations represent a balance between consumer protection and industry flexibility, signalling India's intent to modernize its alcohol framework while fostering innovation and sustainability.

https://www.foodnavigator-asia.com/Article/2026/02/03/clearer-and-more-flexible-indias-2026-alcohol-regulations/

Food companies further limit advertising to children across digital media

Food and beverage companies in the US are tightening voluntary restrictions on advertising to children, extending them more comprehensively across digital platforms.

As of January 1, 2026, participants in the Children's Food and Beverage Advertising Initiative (CFBAI)—including major CPG and fast-food brands—committed to stricter nutrition standards for child-directed advertising on streaming services, podcasts, video-sharing sites, gaming platforms, and influencer marketing.

CFBAI, launched in 2006 under BBB National Programs, already required that advertising to children under 12 meet limits for calories, saturated fat, sodium, and sugar, while promoting nutrient-rich foods. The updated principles reflect the dramatic expansion of children's engagement with digital media since the last major revision five years ago. Companies must now use available tools like exclusion lists and audience targeting to reduce the chance that ads intended for older audiences reach children.

The initiative has already reduced child-directed food advertising substantially, with children seeing 96% fewer food ads on children's TV programming in 2022 compared to 2013. About 80% of participants do not advertise any food or beverages in media primarily directed to children. However, challenges remain. Research published last year found that three-quarters of children encounter branded food content on YouTube, often through influencer videos or thumbnails that are not formally classified as ads.

While the new pledge covers paid influencer advertising, it does not extend to user-generated content where brands are not directly involved, leaving gaps in oversight. Public health advocates argue that voluntary restrictions may not be sufficient to fully protect children from exposure to unhealthy food marketing, though industry leaders emphasize that the updated standards represent a significant step toward aligning advertising practices with modern media consumption.

https://www.foodnavigator-usa.com/Article/2026/02/05/food-brands-update-child-marketing-rules-online/

China cracks down on food live-streaming with strict new regulations

China has introduced the world's first set of regulations specifically targeting food live-streaming, reflecting the enormous influence of this sales channel in the country.

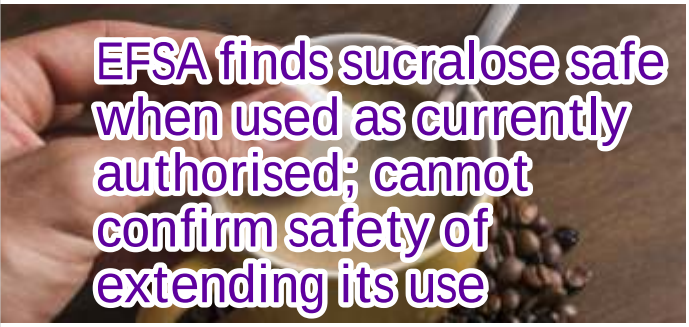
The State Administration for Market Regulation (SAMR) announced that the rules will apply not only to live-streamers themselves but also to e-commerce platforms, live-streaming room operators, marketers, and service agencies involved in these activities. Platforms such as Douyin and Xiaohongshu must now establish formal service agreements, transaction rules, and food safety management systems, including processes for registering live-streaming operators, risk control mechanisms, and violation handling procedures. Operators will be required to provide verified personal and business information, updated every six months, while platforms must maintain a Food Safety Risk Control List for products sold via live-streams.

The regulations also prohibit misleading practices, such as using filters to alter the appearance of food, and ban claims that foods can prevent or treat diseases unless certified as health products. These measures place responsibility on both the visible presenters and the businesses behind them, ensuring accountability across the entire chain. Enforcement will begin on March 20, 2026.

China's move is unprecedented, as most other regions, including the EU and the United States, regulate food safety under general e-commerce laws without singling out live-streaming. The decision reflects the unique scale of the sector in China, where live-streaming accounts for over 23% of online retail sales

and is valued at more than CNY 5 trillion (US$675 billion). This regulatory framework marks a significant step in aligning consumer protection with the rapid growth of digital commerce in the food industry.

https://www.foodnavigator-asia.com/Article/2026/02/16/china-cracks-down-on-food-live-streaming-with-strict-new-regulations/



EFSA finds sucralose safe when used as currently authorised; cannot confirm safety of extending its use

The European Food Safety Authority has reaffirmed that sucralose, also known as E 955, remains safe for consumers when used within its currently authorised applications.

After reviewing all available scientific data, EFSA confirmed the Acceptable Daily Intake of 15 mg per kilogram of body weight per day and noted that consumer exposure is below this threshold.

Sucralose, which is about 600 times sweeter than sugar, is approved for use in a variety of reduced-sugar and sugar-free foods and beverages.

This assessment forms part of the ongoing EU-mandated review of food additives approved before January 2009.

EFSA also evaluated a request to extend sucralose's use to more fine bakery wares beyond its existing authorisation in wafer paper and cones and wafers for ice cream.

However, the panel could not confirm the safety of such expanded uses.

A recent study showed that prolonged exposure of sucralose to high temperatures can lead to chlorine migration and the formation of chlorinated compounds, the health effects of which remain unknown.

EFSA experts highlighted that industrial processes involving extended heating, as well as domestic cooking practices such as baking and frying, could create conditions where these compounds form.

Because cooking times, temperatures, and sweetener quantities vary widely in home kitchens, the possibility of chlorinated compound formation cannot be excluded.

EFSA therefore recommended that the European Commission consider this issue carefully before authorising new uses of sucralose.

The next step will involve discussions between the Commission and Member States on how to follow up on this assessment.

https://www.efsa.europa.eu/en/news/efsa-finds-sucralose-safe-when-used-currently-authorised-cannot-confirm-safety-extending-its