PFNDAI

# FOOD, NUTRITION & SAFETY MAGAZINE

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Prof Jagadish Pai

PROTEIN FOODS AND NUTRITION DEVELOPMENT ASSOCIATION OF INDIA

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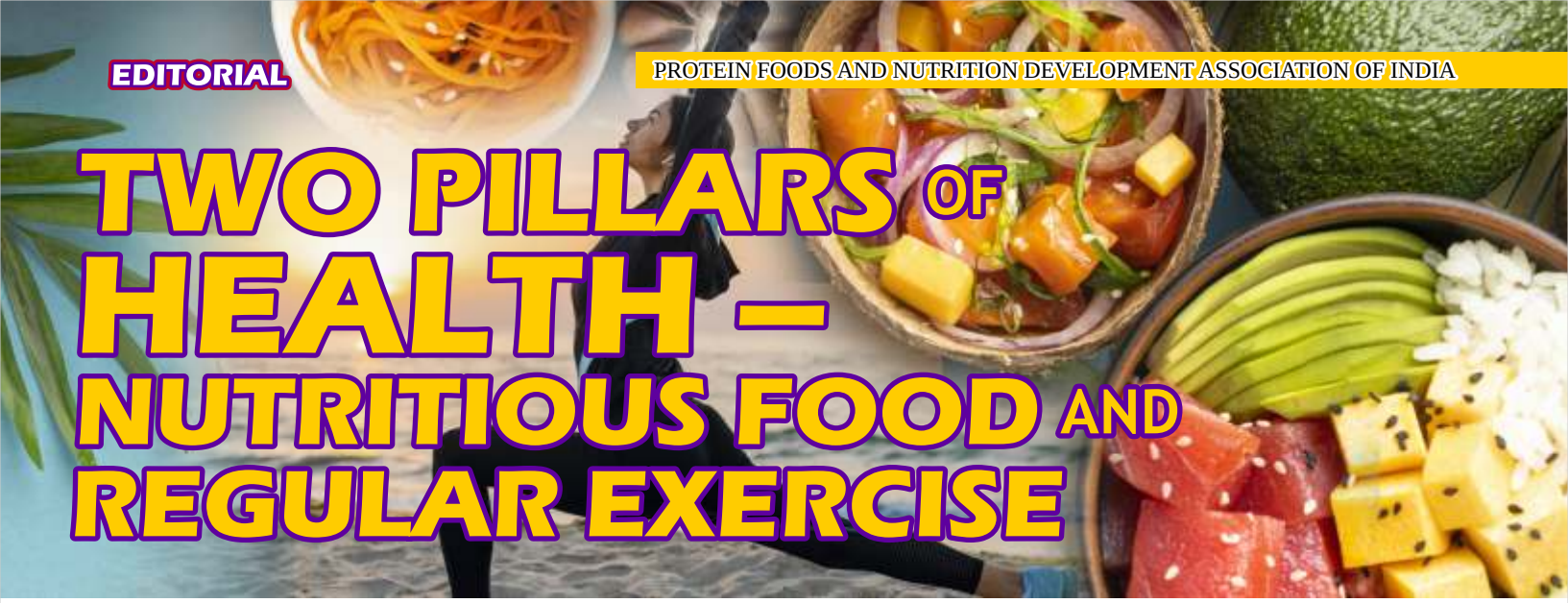

# TWO PILLARS OF HEALTH – NUTRITIOUS FOOD AND REGULAR EXERCISE

There is a lot of talk about obesity, hypertension, cardiovascular diseases, diabetes and many other ailments among Indians, including the children. There are many reasons given about the causes such as sweets, snacks, high fat/sugar/salt foods, carbs, refined food ingredients, processed and ultra-processed foods, street foods, and many others. Everyone is talking about food. There is hardly any talk about physical activity. Is it possible to eat a perfectly balanced diet, not do any physical activity and still remain healthy?

There are a few health professionals who try to promote physical activity including walking, jogging, playing field games and exercises either at home or in gyms, even offices. But mostly we are obsessed only with food. We certainly control our eating because if we overeat, to burn calories is far more difficult and much easier to put on extra weight. However, we must also start a campaign of physical activity and sports.

Our government spends so much time and effort on how to make food labels to tell people about adverse effects of unhealthy foods. Some even wanted to have labels for samosa and jalebi. We are ready to go extra mile or even to ridiculous extent to tell people about dangers of food, but we shy away from creating awareness about spending all those calories by physical activities.

We should be catching them young, when their minds are impressionable. Kids should play rather than watch TV or play games on their phone or computer. Of course, when we ask them to play, we don't realise that there are no playgrounds nearby or public parks where some rallies or other events are taking place. Schools don't have many open grounds where students can play or have physical training.

Even the adults do not have much opportunity for physical activities or even walking is difficult because of dangerous roads and commercially occupied footpaths. Offices would rather make extra office space rather than a place where employees can stretch their limbs or get some physical activity or simply jog or walk. We have tall towers in which offices are located, so even if we would love to walk up the stairs, it is extremely difficult. Even when there is good public transport, our mindset wants us to have a private vehicle to travel. Nowadays, it is easier because of Uber and Ola, so we would avoid any physical strain.

Hence, when we look for the causes of obesity, we should include this very important factor besides food that impacts us. Let us emphasise the needs of various activities and the undesirable impacts of too much time on phones and TVs. Let us start with our children. They would love to play. Of course, if we miss that age, it will be very difficult to catch them again.

We should also ensure good public transport and workplaces conducive for physical activity, where most people who do desk jobs can stretch their legs once in a while. We should create awareness about both a healthy, balanced diet and physical activity. Both are essential for a healthy body.

Prof Jagadish Pai, Editor, PFNDAI

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# WHAT INDIA DOESN'T EAT

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National surveys provide extensive information on food consumption, nutrient intake, growth, health, and livelihood characteristics related to education, shelter, and quality of life.

There is an expectation that these surveys will deliver meaningful measures by setting public health goals and reviewing progress within a specific timeframe. However, this is not evident. Instead, emphasis on the correlation between fat, salt, and sugar with disease prevalence overshadows the population's need and desire for healthier diets. In the rush to confirm existing knowledge, crucial causative factors that hinder nutritional status often fail to attract scientific scrutiny and, consequently, policymakers' attention. Over the past four decades (1975-2012; 2017), Indian diets have not significantly changed the diet-disease relationship; yet we focus on "What India eats." Instead, we should ask, "What India doesn't eat," and why.

Indian dietary patterns are complex. There is significant variation in quantity and quality across regions and states. Merely adjusting food group amounts or their percentage contributions to daily energy (%E)in My Plate, without examining the underlying reasons why people eat what they do, is pointless. Firstly, the survey data is not recent, and there are no subsequent updates. Cereals and millets at 51% E, the mainstay of a grain-based calorie-satiety diet and affordable, are termed "less protective foods" and revised downwards. The public distribution system (PDS) supplies grain instead of pulses, fruit, and vegetables, which is contradictory. Recommendations and measures must align with reality: this is policy.

What India does not eat are the 'more protective foods', pulses, fruits, vegetables, milk and nuts. The average urban regional consumption of fruits and vegetables, which ranges from 28 to 162g, is below the recommended amounts of 150g and 400g. Nuts and seeds are consumed in small quantities, 1.1g to 5.5g, except in the South, where they reach 18.9g. Milk and milk products, with a recommended intake of 300g, are consumed at less than half that quantity. Pulse and legume intake is 35-39g, compared to the recommended 90g. The difference between recommendation and reality is obvious. Does the policy examine why India does not eat these foods? This is only one part of the story.

There is a second aspect: the notable differences in dietary quantity and quality across regions, states, and between urban and rural areas. Although dietary data associated with lower disease prevalence suggest important connections, deeper insights are lacking. Instead, high prevalence is highlighted. Urban North, with 1723 kcal (%E) and a fat intake of 67.3g—the highest among all regions—is promptly attributed to a 15.4% obesity prevalence. The Northeast consumes 2908 kcal—about 60% more than the North—and has a fat intake of 61.5g, with an obesity prevalence of 8.6%. These differences indicate a complex, multifactorial influence rather than simple two-factor relationships. The North consumes only 0.3g more fat than the recommended 67g (FSS 2020). A confirmation bias becomes evident when data is selectively used to support existing correlations while dismissing contradictory insights.

Popular narratives focused on "what India eats" may unintentionally impede more nuanced, interdisciplinary scientific inquiry. Relying on easy correlations can divert policymakers from taking effective action. A higher-level engagement is necessary beyond popular interpretations. Surveys reveal what India eats more or less, with dissimilar outcomes. Only by acknowledging both what is present and what is missing on Indian tables can policy and public health efforts begin to close the nutrition gap and foster healthier, more equitable diets nationwide.

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# THE ROLE OF PROCESSED FOODS IN MODERN DIET: BRIDGING CONVENIENCE AND HEALTH - PART 1

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## Introduction

Processed foods have become an integral part of the modern Indian diet, providing both convenience and nutrition. Rapid urbanization, busier lifestyles, and the rise of nuclear families have driven surging demand for ready-to-eat or easy-to-cook options. At the same time, India faces persistent nutrition challenges – from undernourishment and micronutrient deficiencies to a growing incidence of obesity – creating a pressing need to bridge convenience and health through thoughtful food processing.

India's food industry is evolving to meet these needs, leveraging innovation to make foods that save time yet bolster diets. In the following sections, we examine the journey of food processing in India, the nutrition gaps highlighted by the National Family Health Survey (NFHS-5), and how the industry – supported by enabling policy, via technology, reformulation, fortification, and product diversification. We also consider how processed foods can align with the nation's future nutrition and sustainability goals.

## Evolution of Food Processing in India

Food processing in India has come a long way from traditional kitchen-based methods to a sophisticated, large-scale industry. Historically, processing was done at the household or cottage level (sun-drying vegetables, fermenting batters, hand-grinding grains, pickling fruits) to preserve seasonal produce and enhance flavours. Over the past few decades, organized food processing has expanded dramatically, fuelled by technological advancements and policy support. From Operation Flood modernizing the dairy sector in the 1970s to automated roller mills replacing stone grinders in cereals, and from mechanized bakeries to aseptic packaging in beverages, key sub-sectors have each undergone transformation. These innovations have improved food safety, shelf life, and availability across the country.

Today, India's food processing ecosystem is diverse and technology driven. Mega food parks house state-of-the-art processing lines utilizing automation, high-pressure processing (HPP), freeze-drying, and aseptic packaging.

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Supply chain innovations like expanded cold storage and IoT-based traceability systems (e.g. sensors monitoring temperature/humidity, ERP logistics software) are helping reduce spoilage and improve safety. Yet large portions of the harvest – especially fruits and vegetables – still go unprocessed, indicating room for growth. Only about 2.2% of India's fruits and vegetables are industrially processed, while post-harvest losses in this category range from 6.7% to 15.9%. The World Bank estimates roughly 40% of India's fresh produce is lost before it reaches consumers. Such statistics underscore why continued expansion of processing capacity is vital – not only to reduce waste and enhance food security, but also to deliver nutrition year-round at affordable costs.

However, significant farm-to-fork barriers persist even as the industry modernizes. Many farmers operate on small scales with rain-fed cultivation and minimal storage or refrigeration, leading to inconsistent quality and spoilage of crops before they ever reach a processor. Transporting perishable goods is costly and India's cold-chain capacity remains insufficient in many areas, resulting in high losses during distribution. On the demand side, a segment of consumers is still sceptical of packaged foods, preferring fresh home-cooked meals and perceiving processed items as less healthy or too expensive.

Such fragmentation across the value chain – from farm infrastructure to logistics to consumer perception – limits the sector's impact. Greater integration is needed: for example, linking farmers via cooperatives or contract farming to supply processors reliably, improving rural roads and cold transport, and educating consumers on the benefits of safe, fortified processed foods. Addressing these bottlenecks will help ensure India's agricultural bounty is efficiently converted into value-added products, rather than lost to inefficiency.

## India's Nutrition Gaps: Insights from NFHS-5

A detailed look at India's nutrition profile reveals why food innovation is so critical. The National Family Health Survey (NFHS-5, 2019–21) provides a comprehensive snapshot of nutritional status across the country. While there have been improvements since the previous survey (NFHS-4, 2015–16), malnutrition in various forms remains a serious public health concern. Table 1 summarizes some key nutrition and health indicators from NFHS-5:

Table 1: Selected nutrition indicators from NFHS-5. Despite some progress since NFHS-4, one in every three Indian children is stunted and one in five is wasted, while high anaemia rates and rising obesity indicate a double burden of malnutrition

| NutritionIndicator(India) | NFHS-5(2019–21) |
|---|---|
| Children under 5 stunted (chronically undernourished) | 35.5%[22] |
| Children under 5 wasted (acutely undernourished) | 19.3%[22] |
| Children under 5 underweight (low weight-for-age) | 32.1%[22] |
| Children 6–59months who are anemic (Hb<11g/dL) | 67.1%[23] |
| Women 15–49 years who are anemic (Hb<12g/dL) | 57.0%[24] |
| Women 15–49 years over weight or obese (BMI≥25) | ~23%[25] |
| Men 15–49 years overweight or obese (BMI≥25) | ~22%[25] |

Several insights emerge from this data:

- **Persistent Undernutrition:** More than one-third of Indian children under five are chronically undernourished (stunted at 35.5%), and one-fifth are acutely malnourished (wasted at 19.3%). These figures have improved slightly from NFHS-4 but remain unacceptably high for a country aspiring to global leadership. Stunting reflects chronic undernourishment with lifelong impacts on physical and cognitive development. Progress has been uneven – some districts still have nearly 50% of children stunted so delivering affordable, nutrient-dense foods to vulnerable populations remains a top priority.

- **Hidden Hunger (Micronutrient Deficiencies):** The most glaring gap in NFHS-5 is the extremely high rate of anaemia, a condition largely caused by iron deficiency. A shocking 67% of children 6–59 months are anaemic–meaning two in every three Indian children lack sufficient iron for healthy development. What's worse, anaemia in women of reproductive age increased from 53% to 57% between NFHS-4 and NFHS-5, now afflicting over half of women 15–49. Anaemic mothers are more likely to have low-birth-weight babies, perpetuating a cycle of malnutrition. This "hidden hunger" extends to other micronutrients as well (vitamin D, B12, vitamin A, zinc), though those were not measured by NFHS. Diets dominated by staples with few fruits, vegetables, or animal products have led to widespread deficiencies. Tackling this requires fortifying foods with vitamins and minerals, supplementation programs (e.g. iron–folic acid tablets under Anaemia Mukt Bharat), and diversifying diets with protective foods.

- **Rising Overnutrition:** Coexisting with undernutrition is a rise in overweight and obesity, especially in adults – a dual burden. NFHS-5 found about 23% of women and 22% of men (15–49 years) to be overweight or obese, up from ~18–20% in the last survey. In urban areas these rates are even higher, with some states (Punjab, Kerala) seeing over 30% of adults overweight. A recent analysis noted nearly 20% of Indian households now have all adult members overweight. This trend is linked to sedentary lifestyles and greater consumption of calorie-dense, high in fats and sugars. The proliferation of cheap, tasty but low-nutrient foods is contributing to rising diabetes and heart disease, even as anaemia and stunting persist on the other end. It's a call-to-action for the food industry to create healthier processed options that address obesity risks while also fighting nutrient deficiencies.

- **Protein and Dietary Gaps:** Although protein intake isn't directly measured in NFHS, other studies indicate many Indians consume suboptimal protein. On average, Indians get ~0.66 g of protein per kg body weight, whereas the recommendation is ~0.8 g/kg.

This means a significant segment of the population – especially vegetarians and those with low incomes – may not meet protein needs, affecting muscle development and immunity. Additionally, intake of protective foods like fruits and vegetables is far below the WHO-recommended 400 g/day, limiting vitamin and mineral intake. These gaps reinforce the importance of food-based solutions: fortifying staples with essential nutrients and developing protein-rich products can help close the nutrition divide. India's new Dietary Guidelines (2023) emphasize balanced diets with less refined grains and more millets, fruits, vegetables, and animal proteins.

The food industry has an opportunity to contribute by offering convenient, affordable products that deliver these recommended foods in an accessible form.

In summary, India's nutrition profile is a complex mix of deficits and excesses. The challenge is two-fold: continue reducing undernutrition and micronutrient deficiencies, while curbing the rise of obesity and diet-related diseases.

Processed foods, often seen as part of the problem, can be harnessed as part of the solution – if the industry innovates to make products that are both convenient and nutritious.

## References

1. NFHS-5, Ministry of Health and Family Welfare, Govt. of India

2. FSSAI, Food Fortification Resource Centre

3. WHO Nutrition Database

4. MoFPI, PLI Scheme Updates

5. Eat Right India Campaign, FSSAI

6. PFNDAI Journal Archives

7. USDA GAIN Report: India Food Processing Ingredients

# CHOLESTEROL: THE GOOD, THE BAD AND THE BALANCED TRUTH

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Cholesterol has long been portrayed as a villain in the realm of health and nutrition, often blamed for heart attacks, strokes and a host of cardiovascular issues.

Yet, the truth about cholesterol is far more complex. Cholesterol is a waxy, fat-like substance found in every cell of the human body. It is not inherently bad, in fact, it is essential for our survival. The liver produces about 75% of the cholesterol in the body. The remaining 25% comes from dietary sources such as meat, eggs and dairy products. The cholesterol is made as per the need of the body. However, the problems arise when cholesterol levels become unbalanced particularly when excessive cholesterol from a poor diet overwhelms the body's finely tuned system.

Vital Role of Cholesterol in Body:

- Cell membrane integrity: Cholesterol is a structural component of cell membranes, helping to maintain fluidity and flexibility and directly modulates the signalling pathways
- Cholesterol is a key lipid component of myelin, a vital component of the brain's white matter. Myelin is critical for the proper function of the nervous system and one of the most complex cells–cell interactions of the body.
- Hormone production: Cholesterol is the precursor molecule for all steroid hormones. Without sufficient cholesterol, the body cannot produce adequate levels of sex hormones or adrenal hormones. It is a building block for hormones such as estrogen, testosterone and cortisol.
- Vitamin D synthesis: Vitamin D is synthesized from cholesterol in the skin under the influence of ultraviolet rays. It is important for calcium absorption, immune


function, and protection against many chronic diseases.

- Bile production: Cholesterol is necessary to produce bile acids, which aid in digestion and absorption of dietary fats.

## When Cholesterol Becomes a Problem

There are three main types of cholesterol:

- High Density Lipoprotein (HDL) cholesterol is a "good" cholesterol that experts believe can help protect your arteries.
- Low Density Lipoprotein (LDL) cholesterol is a "bad" cholesterol that can make a sticky substance called plaque build-up in your arteries.
- VLDL cholesterol is another "bad" cholesterol that can also make plaque build-up.
- Non-HDL cholesterol refers to all the cholesterol in your blood except for HDL. Non-HDL cholesterol includes LDL and VLDL. It also includes cholesterol carried on intermediate-density lipoproteins (IDLs) and chylomicrons. These last two usually aren't listed separately.

Very low cholesterol, especially very low levels of LDL cholesterol, can also be associated with some potential problems like haemorrhagic stroke, low birth weight/premature birth, increased cancer risk and other associated symptoms like fatigue, depression and vision changes.

Similarly, too much of cholesterol is also a problem and especially from a poor dietcan tip the scales toward disease.

### 1. Atherosclerosis and Heart Disease

High cholesterol levels become a problem when they contribute to the buildup of plaque in arteries, a condition called atherosclerosis, which can lead to narrow or block arteries, leading to high blood pressure and serious health issues like heart disease and stroke.

### 2. Chronic Inflammation

Diets high in saturated fats, trans fats, and processed foods can increase LDL and decrease HDL levels. This imbalance contributes to chronic inflammation, which plays a central role in many diseases, including diabetes and heart disease.

### 3. Liver Stress

The liver regulates cholesterol levels, but an unhealthy diet can overload it. Non-alcoholic fatty liver disease (NAFLD) is now one of the most common liver disorders and is often linked to high cholesterol and poor dietary habits.

## Dietary Cholesterol: Friend or Foe?

For decades, dietary cholesterol was considered a major risk factor for heart disease. Eggs, shrimp and other high-cholesterol foods were demonized. However, more recent research has challenged this view.

## New Understanding of Dietary Cholesterol

Studies now show that for most people, dietary cholesterol has only a modest impact on blood cholesterol levels. The body adjusts its internal production depending on dietary intake. For instance, if you consume more cholesterol from food, your liver produces less. However, there are individuals who experience a significant increase in their blood cholesterol levels in response to dietary cholesterol intake. Specifically, they show a rise of at least 0.06 mmol/L (or 2.2 mg/dL) in total cholesterol for each additional 100 mg of dietary cholesterol consumed. For these people, moderation remains key.

## The Real Dietary Culprits

Rather than focusing solely on cholesterol-rich foods, it's more important to pay attention to:

- Saturated fats: Found in red meat, poultry, and dairy products (butter, cheese, cream, whole milk) and

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tropical oils like coconut and palm oil.

- **Trans fats:** It is found in processed and packaged foods, including fried foods, baked goods and certain spreads like margarine and shortening.

- **Refined carbohydrates:** Refined carbohydrates are grains and sugars that have undergone processing, removing the natural fiber, nutrients and other beneficial components such as white bread, sugary cereals, and soda.

These dietary components are more strongly associated with increased LDL, triglycerides and lower HDL levels than cholesterol itself.

## Finding the Right Balance

To maintain healthy cholesterol levels and overall wellness, consider the following strategies:

### 1. Eat Healthy Fats

Replace saturated and trans fats with healthier fats which help reduce LDL and raise HDL cholesterol levels:

- **Monounsaturated fats:** Found in plant-based foods, particularly oils, nuts, and avocados.
- **Polyunsaturated fats:** Found in fatty fish, flaxseeds and walnuts. Further, eggs are a unique food source rich in dietary cholesterol but low in saturated fat. Contrary to traditional views, several observational studies and randomized controlled trials have reported that egg consumption does not adversely affect blood lipids or increase CVD risk

### 2. Increase Soluble Fiber

Soluble fiber binds to cholesterol in the digestive system and helps remove it from the body. Good sources include oats, beans, lentils, peas, barley, fruits like apples and pears and some vegetables like brussels sprouts, broccoli, and carrots

### 3. Exercise Regularly

Physical activity increases HDL cholesterol and helps lower LDL and triglycerides. A healthy person should do at least 150 minutes of moderate exercise per week.

### 4. Maintain a Healthy Weight

Excess body fat, especially visceral fat, is linked to higher LDL and lower HDL levels. Weight loss can significantly improve cholesterol levels.

### 5. Avoid Smoking and Limit Alcohol

Smoking lowers HDL and damages arteries, increasing the risk of heart disease. Excessive alcohol can also raise triglyceride levels.

## Cholesterol Is Not the Enemy

Cholesterol plays a critical role in many bodily functions and is essential for life. Problems only arise when cholesterol levels become imbalanced, often due to poor dietary choices and sedentary lifestyles. Rather than eliminating cholesterol-rich foods entirely, the focus should be on eating a balanced diet, limiting saturated and trans fats and incorporating whole, unprocessed foods.

Ultimately, it's crucial to maintain the balance i.e. embracing cholesterol's vital roles while avoiding the dangers of excess.

# PROCESSED FOODS - EFFECT ON NUTRIENTS AND HEALTH - PART II

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## Introduction:

Eating at home or home made food is ingrained in our traditional society and culture. Most working people carry some homemade food to work as a common practice.
It is interesting that some food products were originally introduced to India by foreign cultures and, as a result, have a history of industrial processing before any attempts at homemade production. Chocolate is one such indulgence that was introduced to India by the British empire.

## Chocolate processing

The history of cocoa in India started with the British occupation, at the end of the eighteenth century when the country was part of the British Empire.Cocoa agriculture in India only really took up as recently as the 1960s when Cadbury, with the support of the World Bank and Kerala Agricultural University, launched cocoa agriculture initiatives.The company started industrial production in India since 1948, and initially their entire cocoa bean requirement was imported at a huge transaction cost. Seeking an alternative, the company studied the possibilities of growing the crop locally (1).. Today 1% of the world's chocolates are produced in India. In recent years, many farm-to-table chocolate brands have mushroomed in the Indian market, with curated artisanal products.

Cocoa, the main raw material used for chocolate manufacture contains cocoa fat (25.6%) followed by protein (20.4%), also serves as a valuable source of minerals such as potassium, phosphorus, copper, iron, zinc, and magnesium. Cocoa is a crop with one of the highest contents of bioactive compounds in the plant kingdom. Cocoa beans contain more than 300 identifiable chemical compounds.

Several of these compounds have remarkable qualities, highlighted by their antioxidant and anti-inflammatory action that may have beneficial effects against the development of degenerative and neuro-degenerative diseases. They can also act to modulate lipid metabolism and composition of the intestinal microbiota.

The main bioactive compounds responsible for the health benefits of cocoa and cocoa-based products include, bioactive amines and amino acids (tryptophan, tyrosine, arginine), which play an important role in human health.

The composition of chocolate depends on its formulation, and it is rich in fat due to the addition of cocoa butter into the formulations.

Chocolate processing involves biotechnological (at the farm) and physical (in industry) phenomena; there are no chemical processes in chocolate production. The most important biochemical reactions that occur with proteins, carbohydrates, lipids, and polyphenols during chocolate processing(2).

The number of ingredients in dark chocolate are those that are traditionally used; no unknown additives are used during its processing, and there is no chemical synthesis or extraction of substances from whole foods, so the advice to avoid dark chocolate consumption can overlook its considerable health benefits if it is consumed moderately, avoiding problems that might be linked to its high fat and sugar contents.

Chocolate consumption at <100 g/week may be associated with reduction in cardiovascular disease risks, including stroke, heart failure, myocardial infarction and coronary heart disease.

Moreover, dark chocolate can exert antioxidant activity and improve endothelial function via down- regulation of oxidative stress generated by nicotinamide adenine dinucleotide phosphate oxidase isoform 2 (NOX-2).

The works of systematic reviews and meta-data analyses about chocolate consumption associated with effects on health were reviewed and it has been concluded that there is weak evidence for the effects of chocolate consumption on health outcomes in diseases of diabetic or cardiovascular nature. Evidence for the association between chocolate intake and risk of chronic diseases is inconclusive.

Dark chocolate presents a low glycemic index. The ingestion of a very high amount of chocolate (100 g) in a narrow time window (1 h) in the morning can help to burn body fat and lower glucose levels in postmenopausal women, as well as reduce hunger sensation, the desire for sweets and ad libitum energy intake by ~300 kcal during the day; however, this did not fully compensate for the extra energy contribution of chocolate (542 kcal/day).

A systematic review on whether dark chocolate supplementation has a favorable effect on body weight and body mass index (BMI), revealed a significant reduction in body weight and BMI with chocolate consumption ≥30 g/day during between 4 and 8 weeks.

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Research on eating behaviors among overweight, obese and normal body weight individuals shows that greater emotional eating results in greater desire for chocolate consumption; therefore, an approach considering eating habits and lifestyle suggests that the best way to consume chocolate is to be attentive to the amount, type and frequency of chocolate consumed in the daily diet.

Also, chocolate consumption can modify the intestinal biota and increase the production of short-chain fatty acids (such as acetate, propionate, isobutyrate, isovalerate and valerate); this can significantly reduce the sensation of hunger.

Additionally, it is known that chocolate consumption can (positively or negatively) modify consumer mental states by impacting their emotions and cognitive and sensorial responses.

It is true that chocolate is an energy-dense food, and because of that, its consumption must be moderate, preferably as part of a balanced diet. Moreover, it must be noted that it is also an indulgent food, therefore consumed with lower frequency than regular meals.

Nevertheless, chocolate is rich in bioactive compounds associated to health benefits regarding cardiovascular risk, improving cognitive function, mitigating oxidative and inflammatory burden in degenerative diseases, maintenance of diversity in gut microbiota, weight loss and other benefits and thus should not be considered an unhealthy food.

Many consumers perceive industrially processed foods as lower in quality and potentially harmful to health, with concerns about poor nutrition, additives, and harmful compounds formed during processing.

## Comparison of nutritional values and harmful compounds in Industrially vs. Home made versions of four common foods: plumcake, fish sticks, tomato sauce, and cereal bars (3)

A study was conducted with the aim to compare nutritional values and harmful compounds in Industrially processed vs home made versions of four common foods: plumcake, fish sticks, tomato sauce, and cereal bars. The home made foods were prepared using similar recipes to their industrial counterparts, avoiding technologies and ingredients not available at home.

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Analysis revealed identical nutritional compositions between the industrial and home made versions. Acrylamide (AA) and Maillard reaction (MR) products, considered potentially harmful chemicals in processed food was studied in both products (table 2).

Evaluation showed comparable levels across the food pairs, though home made versions showed slightly higher levels in some cases. AA was undetectable in industrially made plumcake and home made cereal bars, while home made fish sticks had higher AA content than the industrial version.

These findings indicate that homemade foods do not necessarily offer superior nutritional quality or lower levels of harmful compounds compared to industrial products. The classification of food products quality based on processing or industrial ingredients alone is not a reliable indicator of their healthiness.

Industrially processed foods like plumcake benefit from stringent quality control measures, regulatory oversight, and advanced processing technologies, including pasteurization, sterilization, and precise packaging.

These practices significantly reduce the risks of contaminatio n from pathogens such as E. coli and Salmonella. Such levels of control are typically more challenging to achieve in home kitchens.

The industry-made fish sticks undergo a brief deep-frying step before freezing, which is absent in the home-made process.

For the industry-made product, the fat content is higher when pan-cooked compared to oven-cooked, as oven cooking does not involve the use of oil, according to the packaging instructions.

When industry-made fish sticks are pan-cooked with additional oil, the final product's fat content is 11.8%. In the home-made version, fresh fish fillets are used and cooked immediately after breading, without the pre-freezing deep-frying step.

## Table 1: Content of Acrylamide, Furosine, CEL and CML in Plumcakes, Fish sticks and cereal bars

| | Plumcakes | | | Cereal bars | | FishSticks | | | |
|---|---|---|---|---|---|---|---|---|---|
| | IND | HM Dark | HM light | IND puffed | HM flaked | IND Oven | IND Pan | HM Oven | HM Pan |
| Acrylamide(µg/kg) | <LOQ | 11.7 | <LOQ | 153.9 | <LOQ | 29.8 | 26.8 | 56.6* | 37.8 |
| Furosine(mg/100g) | 3.5 | 3.1 | 2.1 | 0.2 | 0.3 | 0. | 0.6 | 0.8 | 0.5 |
| Carboxymethyl-lysine (CML)(mg/100g) | 1.6 | 1.2 | 1 | 0.6 | 0.2 | 0.6 | 0.5 | 0.7 | 0.4 |
| Carboxyethyl-l-lysine (CEL)(mg/100g) | 1.5 | 2.0 | 0.8 | 0.2 | <LOQ | 0.8 | 0.7 | 0.9 | 0.7 |

Furosine, CML and CEL amounts in plumcakes were not significantly different between industrially processed samples and home-made ones.

In the case of ready-made sauces, which are not intended to be consumed alone but as part of a meal, it is difficult to assert that an industrially produced product containing additives like natural flavors and ingredients such as preservatives and tomato concentrate - ingredients that are also commercially available to consumers can be classified as “ultra-processed” solely based on its technological characteristics. Nutritionally, such a product may not be significantly different from what a typical consumer would prepare at home. It is crucial to evaluate the health effects of the entire meal rather than focusing solely on a single food item. This is particularly important for condiments, where the health impact depends on portion sizes and the frequency of consumption.

Ready-made sauces, may contain additives that serve technological purposes such as preservation and flavor enhancement, but these do not necessarily confer a negative nutritional profile compared to home-made versions. Therefore, without comprehensive studies that account for the broader context of dietary intake, including portion sizes, meal composition, and overall frequency, it is premature to claim that home-made sauces are categorically healthier than their industrially produced counterparts. Further research is needed to assess the health impacts of these foods in the context of a complete diet, which includes considering both the nutritional quality and the quantity of consumption within real-world dietary patterns.

Since home-made products develop similar amounts of potentially harmful compounds as well as their industrial counterparts, when exposed to the same thermal process, it can be seen that industrial processing is scaling up of home made food processing.

## Economic benefits of industrially processed food for the consumer.

To cope with the pressure of modern life, consumer demand for convenience foods has increased in the last decades. Comparison of the costs of buying nineteen selected industrially processed dishes commonly consumed in France and of preparing them at home was conducted. Considering only the purchase cost, industrially processed dishes were on average 0.84€/4 portions more expensive than their home-prepared counterparts (3.65 vs 2.81 €/4 portions, respectively. However when the value of time spent preparing the dish at home was further added to the other costs, industrially processed dishes were on average 5.34€/4p cheaper than their home prepared counterparts. There was no difference in energy density between industrially processed and home-prepared dishes (4)

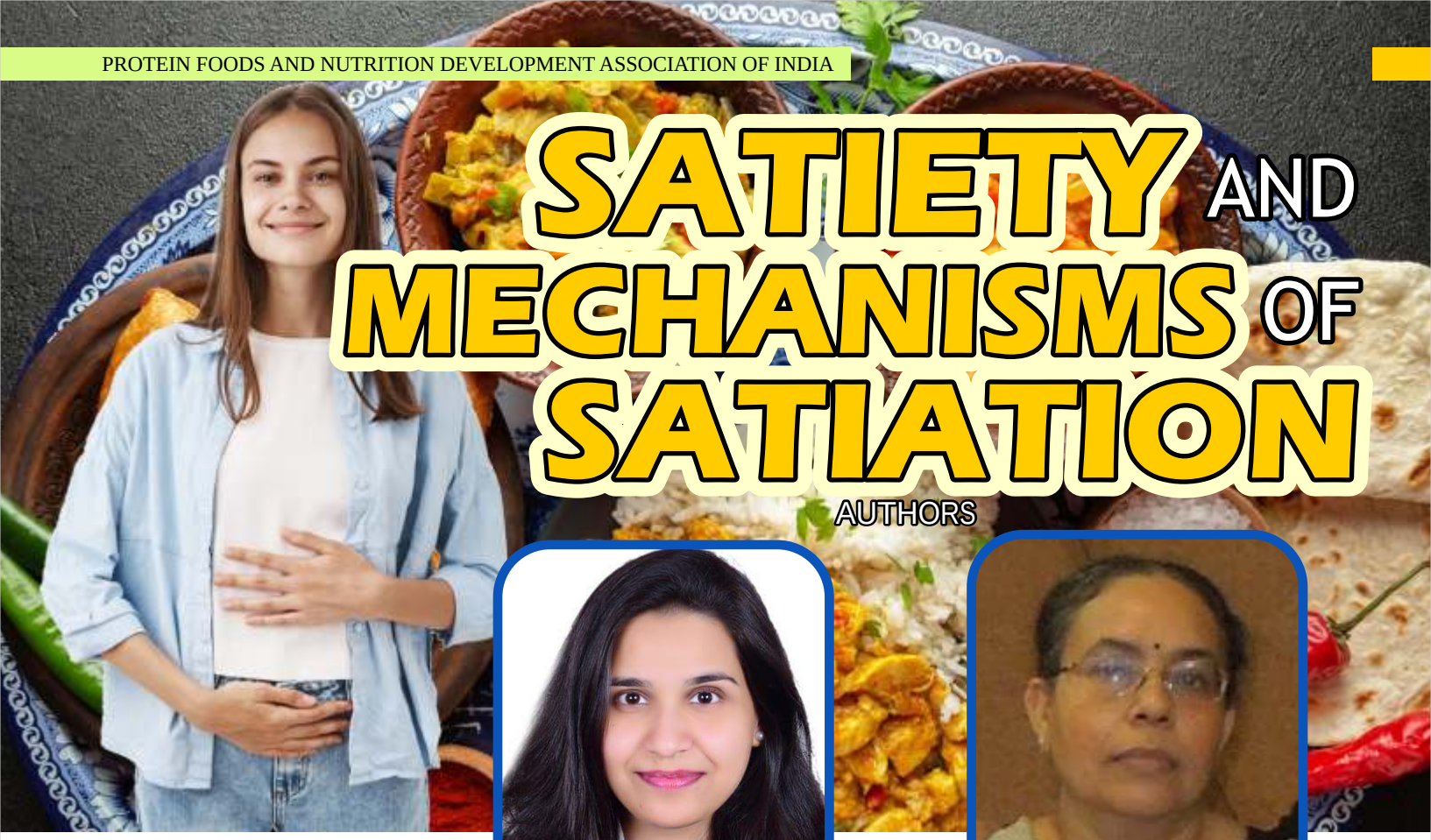
## References:

1. Jayasekhar, S. and Ndung'u, I (2018), Review of economic history of cocoa with special reference to India; Journal of Plantation Crops, 46(2): 133-138.doi: 10.25081/jpc.2018.v46.i2.3727

2. Ditchfield, C.; Kushida, M.M.; Mazalli, M.R.; Sobral, P.J.A., (2023), Can chocolate be classified as an ultra-processed food? A short review on processing and health aspects to help answer this question, Foods, 12, 3070. https://doi.org/10.3390/foods12163070

3. Pellegrini,B., Strootman, L.X., Fryganas, C., Martini, D.,and Fogliano, V., (2025) Home-made vs industry-made: Nutrient composition and content of potentially harmful compounds of different food products; Current Research in Food Science, 10,100958 1-8. https://doi.org/10.1016/j.crfs.2024.100958

4. Tharrey, M.,Drogué, S.,Privet,L., Perignon,M., Dubois, C.,and Darmon, N., (2020), Industrially processed v. home-prepared dishes: what economic benefit for the consumer? Public Health Nutrition: 23(11), 1982–1990 doi:10.1017/S1368980019005081



# SATIETY AND MECHANISMS OF SATIATION

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## Introduction:

Food is an integral and essential part of the human system. The total daily energy intake is a function of both the number of eating occasions that day and their size. Satiation is important in controlling the amount of energy consumed at each of these eating occasions, while satiety affects the period between eating occasions and potentially the amount consumed at the next.

**Appetite is the desire to eat.** It involves the complex interplay between senses, habits, past experiences, future expectations, and available food. Ghrelin is called the hunger hormone and is released from the stomach. When ghrelin levels are high, we feel hungry. After eating, ghrelin levels fall, so we feel satisfied.

## Satiety: The Physiology of Fullness

Satiety is the physiological state of feeling full and satisfied after eating, which helps regulate the time between meals and the overall quantity of food consumed. It plays a critical role in energy homeostasis, the body's mechanism of maintaining balance between energy intake (through food) and energy expenditure (through activity and metabolism).

The duration of satiety, or the period of feeling full after a meal, is an important factor in controlling overall food intake. Enhancing satiety could thus reduce overeating. (1)

Satiety involves a gut-brain signalling pathway where the gastrointestinal tract

Fig 1: Hormones involved in hunger and satiety


(GIT) releases specific hormones in response to food, particularly nutrients like fat, protein, and fibre. These hormones interact with receptors in the brain, especially the hypothalamus, to reduce food intake and prolong the feeling of fullness.

## Short-Term Satiety Signals

Triggered immediately during and after eating, these hormones act quickly and are primarily secreted from the gut:

- GLP-1 (Glucagon-Like Peptide-1): Released from the intestine in response to nutrient ingestion; enhances insulin secretion, delays gastric emptying, and promotes satiety.

- PYY (Peptide YY): Secreted by L-cells in the ileum and colon postprandially; it binds to receptors in the hypothalamus to suppress appetite.

- CCK (Cholecystokinin): Released in response to fat and protein in the small intestine; it promotes digestion, delays gastric emptying, and stimulates satiety signals via the vagus nerve.

These short-term hormones are crucial in determining meal size and help in the early termination of eating episodes. (2)

## Long-Term Regulation of Hunger and Satiety

These mechanisms help regulate overall energy balance over days and weeks:

Leptin: A hormone secreted by adipose (fat) tissue in proportion to fat stores. It acts on the hypothalamus to suppress appetite and increase energy expenditure. Low Leptin levels (as in weight loss) stimulate hunger, whereas high levels (as in obesity) can lead to leptin resistance.

Insulin: Secreted by the pancreas; it facilitates glucose uptake and acts on the brain to regulate appetite in coordination with leptin.

Hypothalamic neurons:
POMC and CART: Promote satiety and reduce food intake.
NPY and AgRP: Stimulate hunger and increase food intake.

Stomach stretch receptors: Stretch receptors in the stomach: These are mechanosensors—specialized sensory receptors that detect mechanical changes, such as stretching or pressure within tissues. In the context of satiety, mechanosensors located in the walls of the stomach detect distension (stretching) that occurs when food enters and fills the stomach during a meal.

Neurotransmitters: Brain chemicals like serotonin and catecholamines also play a role in satiety, particularly in response to macronutrient intake (e.g., carbohydrates can enhance serotonin-mediated satiety).

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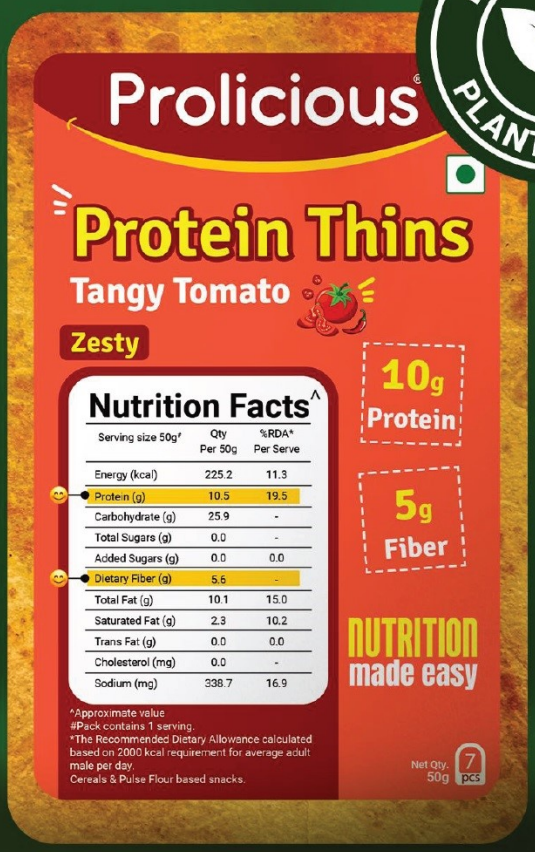





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Table 1: Hormones involved in regulation of satiety

| Neuronal Type | Function | Key Stimuli | Effect on Appetite |
|---|---|---|---|
| POMC | Satiety-promoting | Leptin, Insulin | ↓ Appetite |
| CART | Satiety-promoting | Leptin, nutrient signals | ↓ Appetite |
| NPY | Appetite-stimulating | Ghrelin, low leptin/insulin | ↑ Appetite |
| AgRP | Appetite-stimulating | Ghrelin, fasting | ↑ Appetite (via MC4R block) |

Ultimately, satiety helps regulate meal size, duration, and overall food intake, contributing to energy homeostasis. Energy homeostasis is the body's process of maintaining a stable balance between energy intake (food consumption) and energy expenditure (calories burned).

It ensures that the body has the right amount of energy to function properly, neither storing excessive amounts nor depleting its reserves.

In the long term, adipose (fat) tissue releases leptin; the pancreas releases insulin, which influences the hypothalamus in the brain to regulate appetite and metabolism sustainably. (2)

## Effect of proteins on satiety

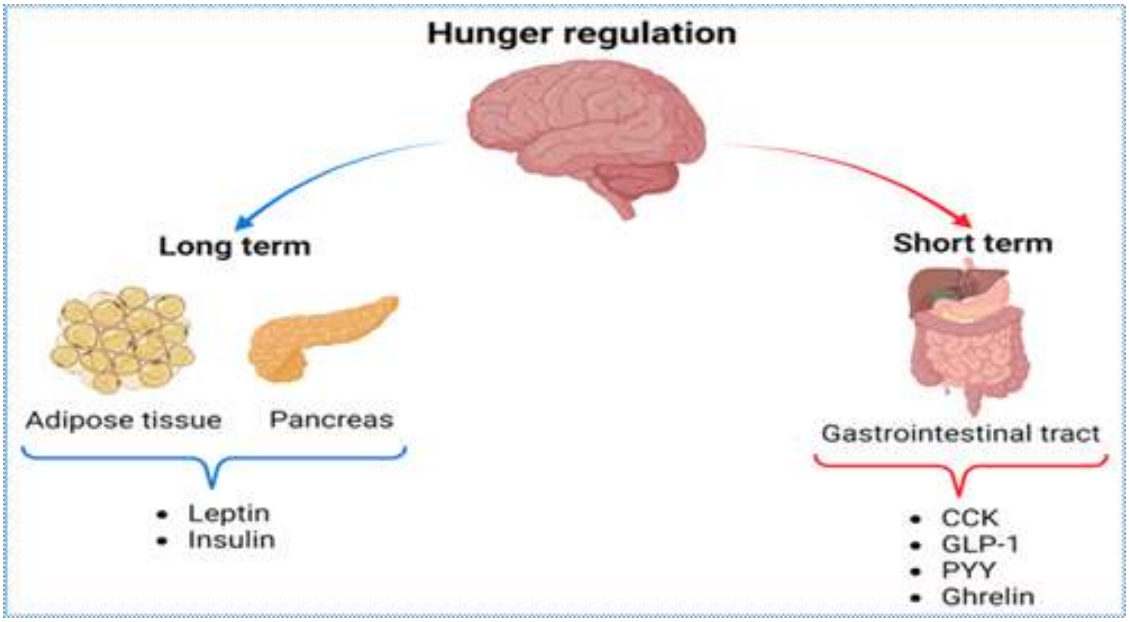
Proteins are the most effective macronutrient for decreasing or inhibiting food intake compared to lipids and carbohydrates. As they pass through the gastrointestinal tract, enzymes hydrolyse proteins, releasing a diversity of peptides and free amino acids. These then induce the secretion of satiety-related hormones in entero-endocrine cells (hormone producing cells in the intestine). Additionally, proteins stimulate energy expenditure by increasing thermogenesis and may act directly on areas of the hypothalamus that regulate food intake.

Several in vitro and in vivo studies have reported a direct relationship between the source of proteins and their ability to induce satiety, causing different responses in inducing the secretion of one or several anorexigenic hormones.

## Plant Proteins (Pulses) and Their Role in Satiety

Pulses have a unique nutritional profile consistent with several dietary composition factors thought to assist with weight control. Pulses (e.g., lentils, chickpeas, beans) are rich in protein, dietary fibre, and complex carbohydrates.

Fig 2: Short- and long-term mechanisms of hunger regulation.



They have a low energy density (~1.3 kcal/g), meaning they provide fewer calories per gram of food, which is beneficial for weight management. Pulses are also characterized by a low glycemic index (GI), typically between 29 and 48, indicating slow and steady glucose release.

Pulses are nutrient-dense foods that containmany nutrients, such as complex carbohydrates, protein, fibre, folate, iron,magnesium, potassium, choline, zinc, selenium, phosphorus, and phytochemicals or bioactive nutrients. They also contain several antinutrients that have been suggested to play a role in energy regulation. The protein-starch matrix in pulses, along with anti-nutritional factors like enzyme inhibitors, phytates, and tannins, slows digestion and absorption, contributing to prolonged satiety. Notably, pulses are also rich in resistant starch and fermentable fibre, which support colonic fermentation and production of short-chain fatty acids (SCFAs). SCFAs have been shown to suppress appetite and reduce hepatic glucose production.

Additionally, a “second meal effect” has been observed with pulses—when a low-GI, fibre-rich pulse-based meal leads to a lower glycemic response at the next meal, suggesting more stable blood sugar regulation and sustained satiety. (3)

## Clinical studies on the effect of consumption of plant proteins (pulses) on appetite and satiety

In controlled studies, meals containing pulses led to:

- Lower postprandial blood glucose
- Prolonged feelings of fullness
- Reduced desire for subsequent snacking

In 2 different experiments, participants were fed the French version of shepherd’s pie made with either potato puree or bean puree. Glycemic responses to the bean meals were significantly lower than with the potato meals. In addition, participants reported significantly less hunger at 180 min, greater satiety at 240 min, and a lower desire to consume “something tasty” after consuming the bean meals. (4)

In the U.S., the Dietary Guidelines for Americans 2020–2025 (DGA) 6 oz eq/week (or 1.5 cups/week) of pulses are recommended as a part of the protein foods in the healthy vegetarian diet pattern. The results of a modelling study provide insight into the nutritional benefits of adding pulses as a replacement for the servings of protein foods and/or refined grains in the 2000 kcal Healthy U.S.-Style Pattern. Depending on the amount, the addition of pulses replacing protein foods, refined grains, or combinations of protein foods, and refined grains increase fibre, iron, magnesium, potassium, and copper. (5)

## Summary

Satiation, satiety, and their effects on eating behaviour are important when considering energy intake, particularly regarding weight control and obesity. The incorporation of legume protein into foods appears to be a viable strategy to encourage legume consumption and improve overall health. By utilizing a combination of food processing techniques and product development it is possible to incorporate more legumes into traditional Indian food products. Thus, taste with health can result in consumer acceptability and wellness.

## Table 2: Summary of pulse nutritional and anti-nutritional components that may help with weight management (3)

| Nutrient/ Anti-nutrient | Brief description of mechanism |
|---|---|
| Carbohydrate | Slowly digestible, low glycemic |
| Dietary fibre | Soluble, viscous fibre gels in small intestine, slowing gastric emptying and hence absorption (ileal brake).<br>Fermentable fibre is digested in the colon by bacteria, which liberates SCFA that may be used for energy, thereby sparing protein and glucose. SCFA may also suppress hepatic glucose production. The SCFA propionate may stimulate satiety |
| Starch | High amylose:amylopectin ratio compared with other vegetables and root crops. Amylose also ferments in the colon and therefore may have effects similar to fibre |
| Resistant Starch (extrusion process) | Amylose starch and the external branches of amylopectin starch gelatinize as a result of heating, but they re-associate or retrograde upon cooling, thereby becoming resistant to digestion. Alpha-Glucosidase enzymes are less capable of reaching the areas needed to digest starch. The starch-protein matrix may also reduce starch digestion rate by limiting enzyme accessibility to the starch. |
| Protein | About 25% energy from protein; bound to starch in matrix, limiting the accessibility of both to digestive enzymes; limiting in amino acids lysine and methionine but when coupled with complementary protein sources such as corn or grain (higher in these 2 amino acids) becomes a complete protein source.<br>Dietary protein may stimulate gut hormones to increase satiety, increase the energy cost of digesting and absorbing a meal high in protein |
| Digestive enzyme inhibitors | Protease inhibitors may inhibit enzymes needed for protein digestion (e.g. trypsin and chymotrypsin); however, they are mostly destroyed by cooking and are not thought to play an important role in weight regulation.<br>Amylase inhibitors may inhibit pancreatic amylase, reducing carbohydrate digestion, but these are also thought to be mostly destroyed during cooking and processing of whole pulses |
| Phytochemicals | Phenolic compounds may reduce enterocyte glucose absorption by interfering with glucose transporters that may help delay postprandial glucose absorption, which may contribute to satiety and delay the return of hunger.<br>Phytic acid (myo-inositol hexaphosphate), the major storage form of phosphate in plant cells, may help delay postprandial glucose absorption, which could contribute to satiety and delay the return of hunger. |
| Energy | Moderate energy density may contribute to satiety, helping to limit energy intake. |

## References for further reading:


1: Benelam, B., (2009), Satiation, satiety and their effects on eating behaviour, British Nutrition Foundation Nutrition Bulletin, 34, 126–173

2: Ignot-Gutiérrez, A., Serena-Romer, G., Guajardo-Flores D., Alvarado-Olivarez, M., Martínez, A. J., and Cruz-Huerta, E., Proteins and Peptides from Food Sources with Effect on Satiety and Their Role as Anti-Obesity Agents: A Narrative Review; Nutrients 2024, 16, 3560. https://doi.org/10.3390/nu16203560

3: McCrory, M.A., Hamaker, B. R., Lovejoy, J. C., Eichelsdoerfer, P. E., (2010). Pulse Consumption, Satiety, and Weight Management; American Society for Nutrition. Adv. Nutr. 1: 17–30, 2010; doi:10.3945/an.110.1006

4: Mollard, R.C., Zykus, A., Luhovyy, B. L., Nunez, M. F., Wong C. L. and Anderson G. H.,The acute effects of a pulse-containing meal on glycaemic responses and measures of satiety and satiation within and at a later meal; British Journal of Nutrition (2012), 108, 509–517 doi:10.1017/S0007114511005836

5: Agarwal, S.; Fulgoni, V.L.,III. Effect of Adding Pulses to Replace Protein Foods and Refined Grains in Healthy Dietary Patterns; Nutrients 2023, 15, 4355. https://doi.org/10.3390/nu1520435


# SEED OILS: HEALTH BENEFITS AND MISCONCEPTIONS

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## Introduction

Seed oils, including canola, safflower, sunflower, and soybean oil, have become staples in households across India and around the world. They have emerged as a primary source of fats in today's diets. Initially, these oils were valued for their affordability, stability, and high smoke points, leading to a significant increase in their usage over recent decades. This rise can be attributed to various factors, including their cooking stability, high content of polyunsaturated fatty acids (PUFAs), and lower cost compared to other fat sources.

This trend has coincided with changes in cooking habits, industrial food production, and evolving dietary guidelines that promote polyunsaturated fats over saturated fats.

Unlike traditional fats, which are high in saturated fatty acids, seed oils are rich in unsaturated fats, particularly PUFAs, known for their ability to lower LDL cholesterol. However, concerns have been raised regarding their high omega-6 content, which may promote inflammation and contribute to chronic diseases.

## Oil's role in our Diets:

Seed oils are important in terms of their diverse fatty acid profiles, impacting various physiological functions and health outcomes. They are key sources of essential fatty acids, omega-6 (linoleic acid) and omega-3 (alpha-linolenic acid), which the body cannot produce and must obtain from food.

Omega-6 fatty acids support skin integrity, immune function, and cellular signalling, while omega-3 fatty acids are known for their anti-inflammatory and heart-protective properties. Seed oils like mustard, sesame, and groundnut also contain monounsaturated fatty acids (MUFAs), which can lower LDL cholesterol and improve metabolic and cardiovascular health.

Achieving a balance of these fatty acids is important; consuming a range of oils helps maintain an optimal omega-6 to omega-3 ratio, reducing chronic inflammation. Additionally, seed oils are rich in bioactive compounds like phytosterols and tocopherols, which provide antioxidant benefits. When cold-pressed and minimally refined, these oils retain their nutrients and support overall health.

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## Cold-pressed VS. Refined oils:

Cold-pressed (or expeller-pressed) oils are extracted without heat or chemical solvents, retaining natural flavours, aromas, and nutrients. However, due to their low smoke point, they may degrade under high-heat cooking. Hence, they are only used in salads as a dressing or for tossing and sautéing purposes.

In contrast, refined oils undergo processing (often with solvents like hexane) and are filtered for clarity, taste neutrality, and higher thermal stability. While solvent residues are negligible in final products, concerns exist around the excessive refinement and potential oxidation of oils during cooking. As frequent heating and reuse of refined oils can produce harmful compounds like aldehydes and lipid peroxides.

## Blended oils:

Blended oils are a combination of two or more types of edible oils mixed to achieve specific characteristics, such as a balanced nutritional profile, enhanced flavour, or a higher smoke point. The proportions of each oil can vary, but typically, each oil in the blend is included in significant amounts. This practice is encouraged by companies to address the imbalance between omega-6 and omega-3 fatty acid intake. Blended oils are popular for their versatility and potential health benefits, offering a way to customise your cooking oil to meet specific dietary needs.

One of the key advantages of blended oils is their ability to provide a more favourable fatty acid profile. For example, in the Indian market, blended oils are available that feature a better balance of fatty acids. A blend of rice bran oil, which is rich in oryzanol and monounsaturated fatty acids (MUFAs), with soybean oil, a source of omega-3s, and filtered flaxseed oil (for an ideal balance of omega-3 to omega-6), produces a product that supports cardiovascular health while improving oxidative stability and heat resistance. These combinations are often designed to be compatible with Indian cooking practices, such as deep frying and tempering.

## Why the omega-6 to omega-3 ratio matters:

Omega-6 and omega-3 are both essential polyunsaturated fatty acids. Essential, it means these cannot be produced by human bodies and must be taken via diet. The balance between both is crucial.

- Omega-6 fats (especially linoleic acid) tend to promote pro-inflammatory eicosanoids, which are vital for immune response and wound healing.
- Omega-3 fats (ALA, EPA, DHA) counterbalance these effects by producing anti-inflammatory mediators.

Inflammation is the body's natural defence mechanism against injury or infection. However, when inflammation becomes chronic or excessive, it can contribute to various diseases. Research indicates that a diet high in omega-6 fatty acids but low in omega-3 can increase inflammatory responses. In contrast, a balanced intake of both fatty acids helps to reduce inflammation.

### Seed oil composition table (1):

| Type of Oil | % Omega-6 (LA) | % Omega-3 (ALA) |
|---|---|---|
| Soybean Oil | ~54% | ~7–8% |
| Sunflower Oil | ~64% | ~0–3% |
| Safflower Oil | ~77% | 0% |
| Groundnut Oil | ~36% | ~0–3% |
| Canola Oil | ~21% | ~11% |
| Rice Bran Oil | ~35% | ~3% |

An excessive intake of omega-6 relative to omega-3 can lead the body toward a chronic inflammatory state, which is associated with cardiovascular disease, obesity, autoimmune conditions, and certain types of cancer. Historically, human diets maintained a balanced omega-6 to omega-3 ratio, typically between 1:1 and 4:1.

Today, particularly in Western diets, this ratio has shifted dramatically to between 15:1 and 17:1 due to the high consumption of omega-6 and a low intake of omega-3s(2).

In the past, plant seed oils were not widely available, but as technology advanced, their production and consumption rose significantly. This increase has sparked debates, with some experts suggesting that the higher intake of omega-6 from seed oils may contribute to cardiovascular risk. However, no high-quality controlled studies have definitively established a causal link between omega-6 intake and heart disease. Consequently, the impact of high omega-6 intake on chronic lifestyle diseases remains inconclusive (3).

A lower omega-6 to omega-3 ratio is considered more beneficial for reducing the risk of chronic illnesses. However, achieving a healthier balance between omega-6 and omega-3 is not about eliminating omega-6s; rather, it involves making thoughtful dietary adjustments.

*Several factors have led to a significant increase in the ratio of omega-6 to omega-3:*

• Reduced consumption of omega-3-rich foods: Traditional diets included wild-caught fish, leafy greens, and pasture-raised animals, all of which are high in omega-3s. Modern diets often lack fatty fish, such as salmon, sardines, and mackerel, which are rich in EPA and DHA. Additionally, grain-fed livestock, prevalent in industrial farming, contain less omega-3 than grass-fed animals.

• Increased consumption of omega-6-rich foods: Diets high in omega-6 polyunsaturated fatty acids (PUFAs) contribute to a physiological environment that is pro-inflammatory, pro-thrombotic, and pro-aggregatory. This can lead to effects such as increased blood viscosity, vasospasm, vasoconstriction, and cell proliferation (4).

• Shift in agricultural practices: Modern agricultural methods have changed the composition of animal feed to prioritize production. As a result, the omega-3 content in meat, eggs, and farmed fish has decreased. Livestock are primarily fed corn and soy, both of which are high in omega-6 fatty acids. This shift alters the fatty acid composition of animal products, skewing our overall dietary balance.

## Seed oils and inflammation/CVD risk:

Not all seed oils affect health in the same way. The effects of seed oils on inflammation and cardiovascular risk are not universally harmful; they depend on several factors, including the oil's fatty acid profile, level of processing, cooking method, and the individual's overall dietary pattern. A key aspect of this discussion is the ratio of omega-6 to omega-3 fatty acids and the potential inflammatory response linked to excessive omega-6 consumption.

Oils that are high in omega-6 polyunsaturated fatty acids (PUFAs), particularly when consumed in fried or highly processed forms, may contribute to pro-inflammatory pathways. This occurs because linoleic acid can be converted into arachidonic acid (AA), which serves as a precursor to inflammatory compounds such as eicosanoids, prostaglandins, and leukotrienes.

However, the risk associated with omega-6 can be mitigated by ensuring an adequate intake of omega-3 fatty acids. For example, eicosapentaenoic acid (EPA) competes with AA for enzyme binding, thereby reducing the production of pro-inflammatory molecules. Additionally, EPA and docosahexaenoic acid (DHA) can generate anti-inflammatory compounds, such as resolvins and protectins. These compounds are essential in the resolution phase of inflammation, helping to reduce the inflammatory response and promote healing. A 2017 review published in Prostaglandins, Leukotrienes and Essential Fatty Acids concluded that linoleic acid, an omega-6 fatty acid, does not raise inflammatory markers in healthy adults when omega-3 intake is sufficient (5).

## Are seed oils toxic?

Seed oils have often been labelled as "toxic" in popular media, with claims that they contribute to the rise of chronic diseases. While some studies suggest potential risks when seed oils are consumed in large quantities or subjected to high-heat processing, a growing body of evidence indicates that seed oils are not inherently harmful.

When consumed in moderation and as part of a balanced diet, seed oils can provide cardiovascular benefits, especially when they replace saturated fats. For instance, a 2019 meta-analysis examined blood and adipose tissue levels of linoleic acid in over 68,000 participants from 13 countries. The researchers tracked the incidence of heart disease and stroke over periods ranging from 2.5 to 30 years. The results showed that individuals with higher levels of linoleic acid (Omega-6 fatty acid) had a lower risk of cardiovascular events, particularly cardiovascular mortality and acute stroke (6).

However, it is important to note that excessive and consistent consumption of seed oils, particularly from frying foods at high temperatures, can increase the formation of aldehydes, which are linked to oxidative stress. This may pose health risks due to lipid oxidation and an imbalance in omega-6 and omega-3 fatty acids.

## Importance of Moderation in Diet:

As with most dietary components, the impact of seed oils on health largely depends on how they are consumed. Problems can arise when intake is excessive, the balance of omega-6 to omega-3 fatty acids is poor, and overall diet quality is lacking.

To incorporate seed oils into a healthy lifestyle, consider the following tips:
Prioritize Omega-3 Sources: Include omega-3-rich foods in your diet, such as soybeans, flaxseeds, walnuts, chia seeds, and fatty fish.

- Use a Variety of Oils: Avoid relying on just one type of oil, as different oils contain various essential fatty acids. Rotating among oils such as mustard oil, soybean oil, olive oil, ghee, and cold-pressed coconut oil can be beneficial.

- Check Food Labels: Always read food labels to find out what type of oil is used in the products you buy.
Limit Deep-Fried Foods: Reduce your consumption of deep-fried items.
Avoid Overheating Oils: Do not overheat or reuse oils when cooking.

- Choose Oils Based on Cooking Needs: Select oils based on the requirements of your recipes. For instance, use cold-pressed oils for salads, mustard oil or ghee for high-heat cooking, and seed oils like canola or rice bran for medium-heat sautéing.

## Conclusion:

Seed oils are not inherently harmful. Their health impact depends on how much, how often, and in what form they are consumed. While overconsumption can disrupt the omega-6 to omega-3 balance, moderate intake of quality seed oils, combined with increased omega-3 consumption, can support heart health and reduce inflammation.

As with all nutrition strategies, balance, variety, and proportionate use are essential. Instead of eliminating seed oils, aim to restore a healthier fatty acid ratio through mindful dietary choices.

## References:

1) https://www.fediol.eu/data/fatty%20acids.pdf

2) https://www.healthline.com/nutrition/omega-3-6-9-overview#omega-6.

3) https://www.healthline.com/nutrition/optimize-omega-6-omega-3-ratio#TOC_TITLE_HDR_4

4) https://pmc.ncbi.nlm.nih.gov/articles/PMC4808858/

5) https://www.sciencedirect.com/science/article/pii/S2405457724001992

6) https://pubmed.ncbi.nlm.nih.gov/30971107/

# FOOD AUTHENTICITY AND FOOD FRAUD

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In 2008, the consumption of adulterated infant formula in China led to illness in thousands of children. This led to the recall of about 9,000 tons of milk powder. A wide investigation into the extent of melamine contamination of dairy products revealed that 22 manufacturers of powdered infant formula were selling melamine-contaminated products with levels as high as 2,563 mg/kg.

Melamine is not permitted in food products, but it is illegally added to increase the protein content of the product. This incident showed the grave consequences of food fraud and the importance of food authenticity (1).

## What is food authenticity and food fraud?

Food fraud refers to the intentional alteration, substitution, or misrepresentation of food products or ingredients for financial gain and without the consumer's knowledge. For example, milk may be diluted with water to increase volume to reduce costs.

While dilution with water may not pose health risks like melamine, it is still a form of food fraud if done intentionally to deceive consumers. These actions are often driven by the desire to maximize profits but can compromise both food quality and consumer safety.

According to a discussion paper on food integrity and food authenticity by the CODEX committee, the definition of food authenticity is the quality of a food to be genuine and undisputed in its nature, origin, identity, and claims, and to meet expected properties (2). In simple words, it ensures that food is exactly what it claims to be.

There are 7 principal ways a food or food ingredient can be adulterated to increase its perceived value (3). Substitution: This involves replacing all or part of a food product with a cheaper alternative. For example, saffron is replaced with safflower and marigold, or substituting basmati rice with regular long-grain rice varieties like Sharbati.

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# FOOD PRODUCT TESTING SERVICES

We are Govt approved testing laboratories by **FDA**
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## 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
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*Unapproved Enhancements:* The use of unauthorized additives intended to deceive standard testing methods. For example, melamine added to increase protein levels in milk, artificial ripening agents like calcium carbide used on mangoes.

*Concealment:* Adulterants are used to hide the poor quality of a product. Examples include using dyes on fruits or vegetables to make them look fresh and vibrant.

*Mislabelling:* This occurs when the label of a food product falsely represents its contents. For example, labelling conventionally grown foods as organic.

*Dilution:* High-value foods are diluted with cheaper substances. Examples include milk diluted with water.

*Counterfeiting:* Fake products are created to closely resemble genuine ones. Examples include imitation cheese made from non-dairy ingredients.

*Gray Market Production / Theft / Diversion:* This involves the unauthorized sale of surplus or unreported products. This increases the risk for consumers as the product may not have proper safety assurances.

## Targeted and Non-targeted testing/analysis

To detect food fraud and ensure authenticity, scientists use different types of analytical techniques. These methods help identify whether a food product has been tampered with or contains what it claims. Broadly, these techniques are classified into targeted and non-targeted analysis, each helps in identifying adulteration or verifying authenticity.

Targeted Analysis (TA) are used when the adulterants are known or when the authentic food contains specific marker compounds that can be used to verify its purity. Here, the analytical methods focus on detecting these known compounds either to identify the presence of a previously recognized adulterant or to determine whether the food has been diluted or substituted.

A wide range of technologies is used in targeted testing, from traditional wet chemistry techniques to advanced, high-end instrumentation like liquid chromatographic mass spectrometry methods.

When a novel adulterant is introduced, one that has not yet been identified, Targeted Analysis cannot detect its presence. Perpetrators continuously develop new adulteration methods that often go undetected by conventional quality control measures.

Non-Targeted Analysis (NTA) is especially valuable in combating these food frauds. Just as DNA profiles are used to identify individuals, food ingredients also possess unique chemical fingerprints that can help determine whether they are authentic and correctly labelled. These chemical fingerprints are generated using a range of analytical technologies, selected based on the specific food product and the attribute being assessed.

Non-Targeted Analysis (NTA) involves creating a chemical fingerprint of a food or ingredient known to be genuine and then comparing it to that of a suspected or questioned sample. It is important to note that while NTA is highly effective in detecting a broad range of adulterants, it may not catch all cases, particularly

when the level of adulterant is very low and falls within the natural variability or "noise" of the data. However, as analytical tools and software continue to advance, the detection rate of NTA is expected to improve significantly.

Research into non-targeted approaches for evaluating both food ingredients and finished products is expanding rapidly. These methods combine laboratory-based analytical techniques with statistical and computational software to assess whether a questioned food sample falls within the expected range of the authentic fingerprint.

If a tested sample is found to deviate significantly from the baseline fingerprint, the resulting data can be used to identify the adulterating substances involved.

Once NTA identifies something foreign that has been added, additional work is then performed to identify the additive, which can be followed up with targeted analysis to further prove at what level the now-identified adulterant is present.

This TA method will be published, and thus begins the search for a newer, unknown additive by food fraud perpetrators. And the food fraud cycle continues (3).

## Food fraud detection in different food samples

### *Meat*

Detection of meat adulteration often involves identifying undeclared species such as pork or horse meat in products labelled as beef or other types. Mass spectrometry method is used, where samples are ionized and the resulting ions are separated according to their specific charge-to-mass ratio. Real-Time Polymerase Chain Reaction (RT-PCR) has also been used to amplify specific DNA sequences, allowing precise identification of species in meat adulteration. This technique has been shown to produce better results than conventional PCR (4).

### *Honey*

Honey is highly susceptible to adulteration. To ensure authenticity and quality, a range of analytical techniques, like High-Performance Liquid Chromatography (HPLC), Gas Chromatography-Mass Spectrometry (GC-MS), are used. GC-MS method is particularly useful in identifying environmental contaminants such as hexachlorobenzene, a fungicide that may enter honey through contaminated pollen or nectar. Isotope Ratio Mass Spectrometry (IRMS) is a highly specialized technique used to detect adulteration with plant sugars (e.g., cane or corn syrup). It works by measuring the ratio of carbon isotopes in the sample, helping to distinguish between natural honey sugars and added syrups.

Surface Plasmon Resonance (SPR) uses fiber optic sensors and is a highly sensitive technique for detecting adulterants like fructose and sucrose. It operates based on the interaction of light with free electrons in a semi-transparent metal film placed on a dielectric substrate, where the refractive index changes due to adulteration, indicating impurity. These methods are crucial in modern honey testing, ensuring compliance with food safety standards and protecting consumers from fraudulent products (5).

### *Milk*

Melamine is a byproduct of the coal industry and is fraudulently added to milk to falsely elevate its protein content. To detect melamine adulteration, a range of techniques are used, each varying in sensitivity, cost, and complexity. Rapid tests offer on-site screening and are especially useful for quick detection. Colorimetric assays, for instance, rely on a visible colour change when melamine is present.

A notable example is the nano-based method developed by the Bhabha Atomic Research Centre (BARC), where a nano-formulation visibly changes colour upon melamine exposure. Immunoassays such as ELISA (Enzyme-Linked Immunosorbent Assay) utilize melamine-specific antibodies to detect its presence with moderate sensitivity.

Rapid test kits, commonly based on immuno-chromatographic strips, also provide quick and user-friendly detection at the point of sampling. Several other techniques like HPLC, Liquid Chromatography– Tandem Mass Spectrometry (LC-MS/MS), Fourier Transform Infrared (FTIR) and Raman spectroscopy are used to detect melamine.
While rapid tests are affordable, easy to use, and suitable for screening, they typically offer lower sensitivity compared to laboratory methods.

On the other hand, techniques like LC-MS/MS can detect melamine at parts per billion (ppb) levels but demand skilled personnel, advanced instrumentation, and extensive sample preparation. The choice of method depends on the required accuracy and available resources (6,7).

## The Human & Economic Cost of Food Fraud

Food fraud is more than just an ethical issue; it has serious health, economic, and trust-related consequences. Globally, it causes an estimated loss of US$10–15 billion each year, with some reports suggesting it could be as high as US$40 billion. These losses come from product recalls, legal actions, and damage to brand reputation.

The human cost is even more worrying. Adulterated food has led to poisonings, allergic reactions, and even deaths. For example, in Spain, over 600 people died in the 1980s when industrial-grade rapeseed oil denatured with aniline was sold as edible oil, a tragedy known as “olive oil syndrome.”

Adulteration of spices with lead, use of calcium carbide to ripen fruits, and formaldehyde in seafood are just a few examples of harmful practices still seen today. These can affect the nervous system, liver, and kidneys, and even lead to cancer with long-term exposure.

Studies suggest that around 57% of people have suffered health problems from consuming adulterated foods. Common symptoms include nausea, diarrhoea, headaches, swelling, and breathing issues. Incidents like the horse meat scandal in 2013 or detergents detected in milk in 2012 show how food fraud can degrade public trust. People begin to question the safety of everyday items like honey, milk, and coffee. This weakens the confidence in the entire food supply chain (8,9).


## Conclusion

Asian countries, particularly China and India, play a major role in the global food system due to their large populations. With over half of the world's population living in Asia, strengthening food control systems in the region is essential for protecting both public health and international trade. Food fraud can happen at any stage from farm to table, and its effects can quickly spread worldwide through global supply chains. Various databases, like the RASFF and China's Food Adulteration Database, track such incidents, helping regulators and industries detect and prevent fraud.

From 2011 to 2020, the RASFF reported over 1000 cases of food fraud (1). Solving food fraud will require combining science, strict policies, and constant vigilance. As fraudsters become more sophisticated, our detection methods and systems must evolve too.

## References:

1. Kemsawasd, V., et al (2023). Incidents and potential adverse health effects of serious food fraud cases originated in Asia. (https://doi.org/10.3390/foods12193522)

2. https://www.fao.org/fao-who-codexalimentarius/sh-proxy/it/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FMeetings%252FCX-733-24%252FWorking%2BDocuments%252Ffc24_07e.pdf

3. John Szplyka, New Approaches to Food Authenticity Testing

4. Samiksha Sharma et al.(2021), Food fraud: A menace to public health (https://www.researchgate.net/publication/357454385_Food_fraud_A_menace_to_public_health)

5. https://fssai.gov.in/upload/uploadfiles/files/Manual%20of%20Honey%20and%20Other%20bee%20Hive%20Products_05082024.pdf

6. https://www.fao.org/food/food-safety-quality/a-z-index/melamine/en/

7. https://www.barc.gov.in/technologies/melamine/index.html#:~:text=in%20raw%20milk.-,BARC%20has%20developed%20a%20simple%20one%2Dstep%20nano%2Dformulation%20for,treatment%20of%20milk%20is%20

8. https://www.freshbyte.com/blog/food-fraud-costs-billions-each-year?utm

9. Haji, A., et al. (2023). Selected food items adulteration, their impacts on public health, and detection methods: A review. https://doi.org/10.1002/fsn3.3732

# HIGH PRESSURE PROCESSING OF FOODS: ENSURING SAFETY, FLAVOUR & NUTRITION

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Food needs to be processed in some way or other before consumption except for may be fresh fruits and salad vegetables that could be eaten without processing. Without processing the microbes and enzymes present in foods would cause spoilage. If pathogenic microbes are present, they may cause diseases if food is eaten without their destruction.

Processing using heat, low temperature, drying, preservatives and other means would destroy, stop or slow down the activity microbes and enzymes so food could be stored for a longer time without spoilage. Microbes may not just cause waste of food by spoilage; some may be pathogenic so may cause food poisoning or food intoxication when eaten so their destruction also makes the food safe.

## Thermal Processing (1, 2)

Heat is the most effective means of destroying microbes. Bacterial and fungal spores are most difficult to destroy and heat can do that very effectively. Thermal sterilisation uses food being heated at over 100°C for an appropriate time to inactivate most resistant bacterial spores such as C. botulinum spores that cause safety concerns in high moisture low acid foods. Products treated for commercial sterilisation are microbiologically stable at ordinary storage temperature for several years.

While processing with application of heat, there are losses of some nutrients as well as changes in some sensory properties such as colour, flavour, texture etc. Thermal pasteurisation is a milder treatment, often using 55°C to 80°C, which destroys vegetative cells of most pathogens and spoilage organisms but thermophiles are not destroyed. It also does not destroy spores and the treatment may actually activate spores into vegetative cells that may grow during storage.

Acid foods such as fruit juices can be pasteurised using relatively milder heat treatment as acidity makes microbes more vulnerable to heat. Pasteurised foods are commonly refrigerated to prevent surviving spores may be activated by heating to vegetative cells during storage and may cause spoilage.


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.

As refrigeration offers temporary relief from spoilage, pasteurised foods have short shelf life from only about a few days to weeks.

As pasteurised products have a short shelf life making them to be distributed and used quickly to avoid waste after use-by-date, another category of food products evolved namely Extended Shelf-Life Foods having shelf life longer than that of pasteurised products. These products undergo processes in between pasteurisation and sterilisation that would eliminate spores of psychrotrophic bacteria responsible for spoilage of pasteurised products. This can be done using temperatures greater than 80°C but less than 100°C . To reduce process severity further some combination of heat and non-thermal processes could be used in order to achieve milder heat processes and longer than pasteurisation shelf life. One of the important processes among non-thermal processes for this purpose is High Pressure Process (HPP).

HPP comprises of prepackaged food being suspended within a pressure chamber containing water. This is then subjected to pressure for specific time. As opposed to heat, pressure is instantly applied throughout the sample irrespective of the size. This pressure is effective against vegetative bacteria but not against spores. When applied singly, HPP works like pasteurisation so the products need to be refrigerated after the process and the shelf life is short. However, when applied with mild heat treatment, the combination treatment produces much more lethality for spoilage microbes and pathogens, while still maintaining the desirable attributes of flavour and taste and conserves the nutrients.

## Inactivation of Microbes with High Pressure (3)

High pressure of about 100 MPa impairs bacterial growth by compromising functions such as DNA replication, transcription, translation etc. At higher pressures, microbes experience lethal injuries due to loss of cell membrane integrity and protein functionality, especially moulds, yeast and parasites. Bacterial spores can survive pressures up to 1200 MPa at room temperature.

As high pressure destroys most food spoilage microbes and many pathogens, decay processes are significantly stopped or prevented. As enzymes also are destroyed, the browning of fresh fruit is also stopped. Flavour, colour and micronutrients are mostly small molecules and are not affected and remain intact. HPP has been shown to be effective for fruit and vegetable products as well as meat and seafoods.

## Inactivation of Microorganisms

| <200 – 400 MPa | 300 – 600 MPa | >600 MPa, >60°C |
|---|---|---|
| Moulds | Bacteria | Spores |
| Yeasts | | |
| Parasites | | |

Products are packed in flexible packages that are water-proof. These are then packed in plastic baskets into a pressure vessel. Water is filled into the vessel and pressure applied normally up to 600 MPa or 6000 bar.

Different temperature and pressure combinations may be used for short time periods. Uniform pressure throughout the food, irrespective of size, geometry or composition, acts instantaneously without leaving much crushing effect on the products. The treatment inactivates microbes and enzymes in minutes with minimal loss of food quality. After treatment, pressure is released and water drained and the product is ready for consumption.

A variety of high moisture foods including solid, liquid and semi-liquid products, can be preserved using HPP. Generally, at least 40% moisture is effective for microbial destruction by HPP. Such products like sausages, cured & cooked meat, cheeses, seafood, ready-to-eat products, dips, sauces could be processed. High moisture foods packed in plastic such as fruits, jams, marmalades and purees are also processed. Even liquids packed in plastic bottles e.g. dairy products, fruit & vegetable juices and bioactive beverages can be handled by HPP.

Package suitable for HPP must have sufficient elasticity to transmit pressure. Under very high pressure the product undergoes temporary compression of 15% so package should be able to handle such compression and decompression. Plastic bottles, pouches, cups and trays of PET, PE, PP or EVOH (ethylene vinyl alcohol) are some of the suitable plastics for HPP. Rigid materials like glass or metal are unsuitable.

## Shelf Life of HPP Products

The shelf life of HPP processed food products will depend both on process conditions used as well as product characteristics. Higher pressure and longer process time favours microbial and enzyme inactivation. Higher water activity and lower pH values of food products also makes the process more effective. Storage temperature also will influence the shelf life. Generally, HPP increases the shelf life approximately 10 times compared to the untreated fresh food or product. Normally sliced meat, wet salad, orange juice or smoothies will have shelf life less than a week whereas upon processing with high pressure they can have a shelf life of about a month or month and half. In case of cream cheese with shelf life of a month can be processed to get several months shelf life.

## Combination Treatment for Longer Shelf Life

As mentioned above high pressure processing was developed as non-thermal process and commonly was used at temperatures lower than 60°C with pressures up to 600 MPa. This eliminated most spoilage organisms and pathogens but not the spores. Using slightly higher pressures along with higher temperatures can greatly reduce spores of C. botulinum as well as B. cereus. When the resistant spores of non-proteolytic were exposed to 600, 650 and 700 MPa at 80°C at pH 7, their D-values declined and spores destroyed as shown intable (1). Also using 600 MPa treatment at 60 to 85°C inactivated spores of B. cereus in cooked rice by 2.2 to 3.4 log during 30 second pressure come-up time and to below detection limit (> 7 logs) after 4 to 8 min process time. Under atmospheric pressure the same would take about 180 min treatment at 85°C .

D-values of Spores of Non-Proteolytic C. botulinum strains in acid buffer

| | D-values (min) at temp of 80 and pressures of | | |
|---|---|---|---|
| Strain | 600MPa | 650MPa | 700MPa |
| Ham-B | 5.9 | 3.3 | 1.6 |
| KAP 9B | 7.7 | 3.4 | 1.8 |
| KAP 18-B | 6.2 | 2.1 | 1.3 |
| 17-B | 3.5 | 2.5 | 1.3 |
| 202-F | 2.9 | 2.3 | 1.2 |
| 610-F | 8.9 | 4.3 | 1.8 |

There are many advantages of pressure-thermal processes beyond extension of shelf life and minimal losses of sensory properties and nutrients. Some indications appear that due to pressure treatment of foods, there is possibility of using less salt, polyphosphates or emulsifiers for desirable sensory attributes. There is also reduction of formation of furan in juices. Thus many possibilities exist for combination treatments in future.

## Advantages/ Disadvantages of HPP (4, 5)

As the products are treated after final packaging, recontamination after processing is avoided. The pressure applied acts instantaneously and uniformly throughout the product so there are no pockets of under or overprocessing. As no heat or very mild heat for a short time is applied this gentle processing retains nutrients, bioactive ingredients and sensory attributes such as flavour, taste and colour of the product. Simultaneously it inactivates harmful microbes and enzymes to make the product safe and with longer shelf life reducing food waste.

Of course, there are some foods that cannot be processed with HPP. As moisture is necessary for the application of high pressure on food particles, low moisture or dry foods and powders cannot be successfully processed. Also products such as bread, cakes or other baked goods suffer textural damage during processing as they have air pockets that may collapse. Also if there are any microbial toxins already present, they will not be deactivated.

The cost of the equipment may range from 500,000 to 4,000,000 USD depending on the volume and automation included. However, it is estimated that unit cost may be as low as about 10.7 cents/L for a capacity of about 3,000 L/h, which although higher than thermal processing (1.5 cents/L) may be worth the benefits of such processing. The food products processed by HPP will have clean labels.

## Conclusions

HPP food market size was estimated to be 8 billion USD in 2024 and is expected to grow to over 18 billion USD by another decade (6). Thus, as consumers demand safer but more nutritious and naturally flavourful foods with cleaner labels, this market will have a healthy growth.

However, there are some other non-thermal technologies such as ultrasound, irradiation, pulsed electric field, UV treatment and cold plasma treatments being investigated seriously that would also be considered in future for similar advantages as HPP (2).

## References:

1. Balasubramaniam et al. 2016 (https://www.ift.org/news-and-publications/food-technology-magazine/issues/2016/december/features/minimally-processed-foods-high-pressure-processing-esl-foods)

2. Chacha et al. 2021 (https://www.mdpi.com/2304-8158/10/6/1430)

3. What is High Pressure Processing (HPP)? (https://www.thyssenkrupp-uhde.com/high-pressure-processing/en/what-is-hpp)

4. Janahar& Balasubramaniam, 2022 (https://ohioline.osu.edu/factsheet/fst-fabe-1001)

5. High Pressure Processing (HPP) of Food: A Cutting Edge Non-Thermal Preservation Method, 2024 (https://foodmicrobe-basic.com/high-pressure-processing-non-thermal-food-preservation/)

6. Global High Pressure Processing HPP Foods Market Overview (https://www.marketresearchfuture.com/reports/high-pressure-processing-foods-market-38778)

# REGULATORY ROUND UP

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Dear Readers,

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

Revised list of FSSAI notified laboratories for testing of fortificants in Fortified Rice (FR), Fortified Rice Kernel (FRK) and Vitamin-Mineral Premix for Fortified Rice Kernel : The approved list of laboratories for testing fortificants in FR is given in Annexure 1, FRK is given in Annexure 2, and vitamin-mineral premix in FRK is given in Annexure 3, respectively,in the order.

FBOs should check the latest validity of the accreditation of these notified laboratories before sending samples. This order supersedes the earlier order dated 18.03.2025.

Draft Food Safety and Standards (Food Products Standards and Food Additives) Amendment Regulations, 2025 relating to Cheese powder etc. : The draft regulation proposes amendments in the standards of Ghee, meat and meat products and beverages.
Any objections, suggestions should be sent to the CEO in the prescribed format within sixty days from 10.06.2025.

Roll out of "Single Sign On" to FICS, feature to the Customs Officers at Kakinada port (Port Code: INKAK1) and Talegaon (Port Code: INTLG6) : At present the import of food is through 162 Point of Entry (POE) of which FSSAI officials are working as Authorised Officers (AOs) at 78 POEs and custom officers work as AOs at remaining 82 POEs.

FSSAI has an online clearance system for food import called the Food Import Clearance System (FICS), which is integrated with Customs ICE-GATE (Indian Customs Electronic Commerce/ Electronic Data Interchange (EC/EDI) Gateway). Presently, FICS is only implemented at the POEs where FSSAI officials are working. The manual system is being operated at other POEs.

Therefore, Food authorities have decided to do it at all entry points. As a pilot roll out of "Single Sign On", now the FICS and ICE-GATE will be implemented at two POEs, i.e., Kakinada port and Talegaon port.


# Black tea and berries could contribute to healthier aging

Higher intakes of black tea, berries, citrus fruits and apples could help to promote healthy ageing, new research has found.

This study conducted by researchers from Edith Cowan University, Queen's University Belfast and Harvard T.H. Chan School of Public Health, found that foods rich in flavonoids could help to lower the risk of key components of unhealthy ageing, including frailty, impaired physical function and poor mental health.

Collaborative research from Edith Cowan University, Queen's University Belfast, and Harvard T.H. Chan School of Public Health.Population: 86,430 U.S. adults (62,743 women and 23,687 men) followed over 24 years.The relationship between flavonoid-rich foods and three markers of unhealthy aging: Frailty, Impaired physical function & Poor mental health

Women with the highest flavonoid intake had15% lower risk of frailty, 12% lower risk of physical impairment&12% lower risk of poor mental health. Men showed fewer associations overall, but higher flavonoid intake still correlated with 15% lower risk of poor mental health.Flavonoid-Rich Foods Studied: Black tea, Berries (e.g., blueberries, strawberries), Citrus fruits, Apples and Red wine. These are known for their antioxidant, anti-inflammatory, and vascular-supportive effects, and their roles in maintaining muscle mass and cognitive health.

Increasing flavonoid-rich foods by just three servings per day led to:6%–11% lower risk of all three aging outcomes in women. Notably, a 15% reduction in poor mental health risk in men. The observed benefits are likely due to flavonoids' capacity to:Reduce oxidative stress and inflammation, enhance endothelial function& preserve skeletal muscle and neural integrity.

This reinforces the concept of nutritional modulation of aging trajectories, offering low-cost, culturally compatible interventions — especially relevant for aging populations with rising risks of frailty and mental health decline.

www.sciencedaily.com/releases/2025/05/250505121914.htm

# Food as medicine: How diet shapes gut microbiome health

The modern Western-style diet -- high in processed foods, red meat, dairy products, and sugar -- alters the composition of the gut microbiome in ways that can have a huge impact on health.

This dietary pattern, which is also low in fruits, vegetables, and whole grains, reduces the variety of microbes in the digestive system and the metabolites they produce. This, in turn, increases risk for several immune system-related conditions such as inflammatory bowel disease.

In new research published in Nature, researchers from the University of Chicago show how mice fed a Western-style diet are not able to rebuild a "healthy," diverse gut microbiome following antibiotic treatment. These mice were also more susceptible to infection by pathogens like Salmonella. However, mice given food loosely mimicking a Mediterranean diet -- high in plant-based fibre from fruits, vegetables, and whole grains -- were able to quickly restore a healthy and resilient gut microbiome after antibiotics.

To understand how diet modulates the ability of the gut microbiome to recover after antibiotic disruption, and how this influences susceptibility to pathogens like Salmonella. Mice fed either:A Western-style diet (WD): high in saturated fat, sugar, animal protein, and low in fibre or A regular chow (RC) diet mimicking a Mediterranean pattern: diverse plant fibre and low fat.

After antibiotic treatment, some mice remained on their original diets; others switched.Some mice received fecal microbiota transplants (FMT) to assess whether microbiome recovery could be accelerated externally.

Mice on WD failed to rebuild a diverse microbial community post-antibiotics.They remained vulnerable to Salmonella infection despite FMT.RC-fed mice restored microbial diversity and function rapidly.Even when RC was introduced after antibiotics, recovery was successful — indicating some reversal of damage is possible.

Think of the gut like a forest after wildfire (antibiotics) — nutrients from diet are the seeds and fertilizer.WD fails to support recolonization of keystone species; it enables a few opportunistic microbes to dominate, stalling ecological succession.RC creates metabolite networks conducive to microbial diversity and long-term stability.

FMT alone is ineffective on a poor dietary substrate.Even "ideal" microbial donors can't establish if the gut environment is incompatible."It's not just about what you transplant, but where you plant it."

Benefits of study could inform dietary prehabilitation before surgeries, cancer therapy, or antibiotic regimens. It highlights the therapeutic potential of dietary fibre as a foundational tool for microbiome-targeted recovery and supports precision nutrition and custom diet+probiotic/supplement combos for microbial restoration.The study adds nuance to the "food as medicine" narrative — suggesting that food isn't just nourishing, but also cultivating the microbial allies that safeguard immune, metabolic, and neurocognitive health.

www.sciencedaily.com/releases/2025/05/250506131151.htm

# Gut bacteria and acetate, a great combination for weight loss

Researchers led by Hiroshi Ohno at the RIKEN Center for Integrative Medical Sciences (IMS) in Japan have discovered a new way to reduce obesity.

Their study shows that supplying the gut with extra acetate reduces fat and liver mass in both normal and obese mice, as long as bacteria of the Bacteroides species is also present in the gut. When both these conditions are met, gut bacteria can eliminate more sugars from the gut and promote the burning of fats for energy in the host. The findings were published in the scientific journal Cell Metabolism.

Affecting hundreds of millions of people around the world, obesity constitutes a global epidemic. It is linked to eating too much sugar and starchy foods and is known to increase the risk of heart disease, type-2 diabetes, and cancer. At the same time, studies show that eating fibre reduces the risk of the these very same diseases -- even though it cannot be digested directly by mammals. When fibre reaches your gut -- the large intestine to be precise -- it is fermented by bacteria and the byproducts are released into the gut lumen, with some of them making it into the bloodstream.

To test whether delivering acetate — a fermentation byproduct of dietary fibre — directly to the large intestine, in combination with specific gut bacteria (Bacteroides spp.), can reduce obesity by altering host metabolism.AceCel is a cellulose-based acetate supplement developed to deliver acetate to the distal colon, where it can act effectively without being metabolized too early.This bypasses the variability in endogenous acetate production from dietary fibre fermentation, making effects more predictable and potent.

Mice (both normal and obese) received either:A standard diet, AceCel, or Other short-chain fatty acids (SCFAs) as controls. Some mice had no gut microbes; others were colonized with various Bacteroides strains to isolate bacterial influence.

AceCel led to significant reductions in body fat and liver mass — but only when Bacteroides bacteria were present.Weight loss occurred without muscle loss, preserving lean mass.Metabolic shift observed: More fat burned at rest, Less carbohydrate oxidation&Lower hepatic glycogen stores. Gut microbes, when supplied with acetate, enhanced fermentation of dietary carbohydrates, reducing sugar availability and encouraging fat-burning

metabolism. In bacteria-free mice or with other SCFAs, these effects were absent — showing a synergistic requirement for acetate and Bacteroides. This provides a proof-of-principle for developing targeted functional foods or supplements (like AceCel) that rely on prebiotic-microbiota symbiosis to combat obesity. Addresses key challenges of dietary fibre variability, microbiota composition, and metabolic personalization.

www.sciencedaily.com/releases/2025/05/250519131258.htm

## Vitamin D supplements show signs of protection against biological aging

Results from the VITAL randomized controlled trial reveal that vitamin D supplementation helps maintain telomeres, protective caps at the ends of chromosomes that shorten during aging and are linked to the development of certain diseases.

The new report, which is published in The American Journal of Clinical Nutrition, is based on data from a VITAL sub-study co-led by researchers at Mass General Brigham and the Medical College of Georgia, and supports a promising role in slowing a pathway for biological aging. “VITAL is the first large-scale and long-term randomized trial to show that vitamin D supplements protect telomeres and preserve telomere length," said co-author JoAnn Manson, MD, principal investigator of VITAL and chief of the Division of Preventive Medicine at Brigham and Women's Hospital, a founding member of the Mass General Brigham healthcare system. "This is of particular interest because VITAL had also shown benefits of vitamin D in reducing inflammation and lowering risks of selected chronic diseases of aging, such as advanced cancer and autoimmune disease."

Telomeres are made of repeating sequences of DNA, or base pairs, that prevent chromosome ends from degrading or fusing with other chromosomes. Telomere shortening is a natural part of aging and is associated with an increased risk of various age-related diseases.

A randomized, double-blind, placebo-controlled trial in 1,054 adults as part of the larger VITAL study, followed over 4 years. Supplement of Vitamin D3: 2,000 IU/day and Omega-3 fatty acids: 1 g/day. Telomere length was measured at baseline, Year 2, and Year 4.Vitamin D supplementation significantly slowed telomere shortening compared to placebo, equivalent to preserving nearly 3 years of biological aging.This aligns with prior VITAL results showing vitamin D’s roles in lowering inflammation, autoimmunity, and advanced cancer risk.Omega-3 fatty acids showed no significant effect on telomere dynamics.

This is the first large-scale, long-term trial to establish a causal link between vitamin D and telomere preservation. It offers a compelling case for targeted supplementation, especially in populations at risk of deficiency or accelerated biological aging. Further studies could explore mechanistic pathways, dose responsiveness, and synergy with other lifestyle interventions (e.g. exercise, microbiome modulation).

www.sciencedaily.com/releases/2025/05/250521161101.htm

## Looking to cut calories? Try adding chilies, study suggests

Throwing a little heat on your meal might be an effective strategy for cutting back on calories, according to a new study led by researchers at Penn State.

Scientists at the University's Sensory Evaluation Center examined how increasing "oral burn" -- the spicy taste from ingredients like chili pepper -- affects how much food people consume during a meal. The findings, available online now and slated to publish in the October issue of the journal Food Quality and Preference, suggest that making the meal slightly spicier led participants to eat less, consuming fewer calories.

"We know from previous studies that when people slow down, they eat significantly less," said Paige Cunningham, a postdoctoral researcher and lead author on the study who earned her doctorate in nutritional sciences from Penn State in 2023. "We suspected that making a meal spicier might slow people down.

We thought, let's test, under controlled experimental conditions in the lab, if adding a small amount of spice, but not so much that the meal is inedible, will make people eat slower and therefore eat less."

Researchers explored whether mild increases in meal spiciness (via dried chili) could influence oral processing behaviours and reduce calorie intake without compromising taste.Participants: 130 adults across 3 experiments.Meals tested: Beef chili and chicken tikka masala, each offered in mild and spicy versions.Spiciness control: Achieved by adjusting hot-to-sweet paprika ratios while maintaining consistent chili flavour.High-resolution video was used to track bite size, pace, water intake, and subjective measures (appetite, liking, spiciness).

Spicy meals led to slower eating:Reduced eating speed (g/min), Smaller bite sizes&Longer time spent chewing. Caloric intake decreased despite meals being rated just as enjoyable.Water consumption remained consistent, ruling it out as a confounder.Satiation was comparable: Participants felt just as full after eating less spicy food.Spiciness may increase oral burn, slowing the eating rate.A slower pace allows satiety signals to register sooner, curbing intake.
www.sciencedaily.com/releases/2025/05/250522124747.htm

## Seed oils may lower heart attack risk and inflammation biomarkers

New research challenges the claim that seed oils promote inflammation, finding that linoleic acid may instead improve cardiometabolic health.

TThe omega-6 fatty acid is found in plant foods and vegetable oils, especially in seed oils such as soybean and corn.According to a study involving nearly 1,900 participants, higher levels of linoleic acid in blood plasma were associated with lower levels of heart risk biomarkers, including those related to inflammation.

The researchers note that the finding is consistent with previous observational studies showing that higher linoleic acid is linked to a lower risk of heart attacks, strokes, and type 2 diabetes.Public figures like US Health and Human Services Secretary Robert F. Kennedy Jr. have called for eliminating seed oils due to their alleged links to inflammation and disease. He has claimed that restaurants “unknowingly poison” consumers with seed oils, suggesting that the obesity epidemic is linked to when fast food restaurants switched from beef tallow to seed oils.

Whether blood plasma levels of linoleic acid—an omega-6 fatty acid found predominantly in seed oils—correlate with inflammatory and metabolic health markers.Participants: ~1,900 individuals, evaluated using objective biomarkers rather than self-reported dietary data.

Higher linoleic acid levels were linked to lower:Glucose and insulin, HOMA-IR (a proxy for insulin resistance), Inflammatory markers: C-reactive protein, glycoprotein acetyls, serum amyloid A.

Parallels large-scale studies showing that plant oil consumption (including seed oils) vs. animal fats is associated with:Lower all-cause mortality&Reduced risk of heart attacks, strokes, and type 2 diabetes. Opposes public claims that seed oils are inherently pro-inflammatory.Supports the call for precision nutrition over broad dietary generalizations.

Linoleic acid is a precursor to bioactive lipids—some of which are pro-inflammatory (e.g. arachidonic acid), while others are neutral or even anti-inflammatory depending on context.The net inflammatory effect may depend on background diet, antioxidant availability, and genetics—a classic example of nutrition biochemistry in flux.Supports re-evaluation of dietary fat quality in food labelling systems—especially amid rising scepticism of seed oils.

https://www.nutritioninsight.com/news/seed-oils-heart-disease-diabetes-risk.html

## “Big bet” on early life nutrition blends probiotics with HMOs

An early-life nutrition product tailored for gut health and similar to breast milk, is rolling out across Latin America and the Middle East, following its European debut.

Further launches in Asia will take place later this year. Under the baby formula NAN brand, Sinergity’s proprietary

blend combines probiotics with six human milk oligosaccharides (HMOs) that are structurally identical to those found in breast milk. Breast milk is widely considered the gold standard for infant nutrition.The brand claims this combination helps contribute to a more favourable gut environment and stronger immunity in early childhood.

A proprietary blend of probiotics and six HMOs (human milk oligosaccharides) structurally identical to those in breast milk. Emulate breast milk to support infant gut microbiota and early immune system development—hallmarks of optimal early-life nutrition. These complex carbohydrates are indigestible by infants but selectively feed beneficial microbes (like Bifidobacteria), helping shape the gut microbiome, influence immune signalling, and block pathogen attachment. This synbiotic pairing enhances microbiome modulation across early life stages. More than 30 years of HMO research, providing strong clinical credibility and formulation experience.

HMOs are moving beyond infancy, hinting at roles in adult gut health, metabolic support, and immunomodulation. Companies like Novonesis and dsm-firmenich are developing customized HMO blends tailored to developmental stages and possibly individual microbiome profiles. As more countries greenlight biotech-produced HMOs, a standardized global regulatory approach may emerge—particularly relevant for cross-market health claims and infant safety standards.
https://www.nutritioninsight.com/news/nestl-infant-early-life-hmo-baby-formula-probiotics.html

## New research reveals how dietary proteins alter the gut microbiome and metabolic pathways

Protein sources can significantly affect gut microbiota, which may have implications for human health and disease prevention, according to recent research.

Based on the study, egg white protein may negatively affect gut health by promoting mucin-degrading bacteria, brown rice was shown to be less harmful and more compatible with maintaining microbial balance, and yeast was in the middle, offering beneficial shifts but risking mucosal degradation.

Protein sources most strongly influenced microbial pathways involved in amino acid metabolism and glycan (complex sugar) degradation. Long chains of sugars attached to proteins — glycans — changed the gut microbiome's function. The researchers from North Carolina State University, US, believe their findings could help prevent and treat gastrointestinal diseases, which affect millions of people's quality of life.

Different proteins—egg white, brown rice, yeast—caused distinct changes in the gut microbiota of mice, both in composition and function.Egg white protein notably promoted mucin-degrading bacteria, which could compromise the gut's mucosal barrier, a crucial defence against pathogens.Brown rice protein supported a more balanced microbiome, with lower risk of mucosal degradation and healthier glycan metabolism.Yeast protein had a mixed impact—encouraging beneficial shifts but also posing a potential mucosal risk.

Amino acid metabolism was heavily influenced, with increased degradation in brown rice and egg white diets.Glycan (complex sugar) degradation was unexpectedly prominent—especially concerning given its ties to mucin degradation and gut lining integrity.

The team didn't just map "who" was present in the microbiome—they assessed "what they were doing." That's the power of the metagenomics-metaproteomics combo. It allowed them to pinpoint bacterial activity linked to glycan degradation enzymes, which could erode mucin—essential for a healthy gut barrier.

Implications: adds nuance to the long-standing debate about animal vs. plant protein in human diets; suggests a need for reconsidering isolated protein supplements (e.g., egg white powders) in favour of more holistic or mixed-protein sources; raises questions about protein selection in functional foods and clinical nutrition, especially for patients with gut disorders.

https://www.nutritioninsight.com/news/protein-sources-gut-microbiome-research.html

# Social media “super-spreaders” push harmful diet fads to millions, new report warns

Up to 24 million people could face serious health consequences from following extreme diet advice on social media, according to new research exposing a wave of influential accounts peddling misinformation for profit.

A joint analysis by the Rooted Research Collective (RRC) and the Freedom Food Alliance (FFA) has identified 53 high-profile “super-spreaders” on Instagram who routinely share what they deem harmful nutrition guidance. Most have no health-related qualifications, yet their posts directly contradict global public health advice.

“Nutrition is complex, but it doesn’t have to be confusing,” says Alice Millbank, co-founder and chief scientific officer at RRC. “Super-spreaders exploit that confusion by offering dangerously simple answers dressed up as hacks, often driven by profit, not science.”

The report, Nutrition Misinformation in the Digital Age, warns that extreme diet trends — such as carnivore or raw milk regimens — are being popularized by influencers presenting themselves as experts, often without credible credentials. RRC found that 96% of the influencers profiled had a financial interest tied to their content, from selling supplements and courses to hosting diet-based conferences.

Many of these influencers fall into three categories: the “Doc,” who fabricates or exaggerates medical expertise; the “Rebel,” who fuels anti-establishment sentiment; and the “Hustler,” who packages and markets lifestyle changes for sale.

96% of these influencers profit directly from their content, with some earning over $100,000 per month.Up to 24 million followers may be influenced by harmful advice.Many promoted messages actively discourage plant-based diets, endorse red/organ meats, and advocate unpasteurized milk—posing risks of chronic disease, especially among audiences who don't share the influencers’ lifestyles or physical activity levels. These trends threaten to erode trust in public health authorities by co-opting medical language or credentials.

Policy Recommendations: Education- Introduce nutrition and digital literacy in school curricula.Teach practical cooking skills and how to identify misinformation.

Online Counterbalance- Support qualified UK-based health professionals to gain visibility online and share credible, evidence-based nutrition content.

Regulatory Oversight-Set standards for use of professional titles on social platforms.Penalize misuse of terms like “doctor” when not medically valid.

Millbank also suggests platform-level solutions: fact-checking, algorithm adjustments, and greater transparency around commercial affiliations and credentials.

https://www.foodingredientsfirst.com/news/harmful-diet-fads-social-media.html

# FOOD SCIENCE & INDUSTRY NEWS

## Designer microbe shows promise for reducing mercury absorption from seafood

Scientists inserted DNA-encoding methylmercury detoxification enzymes into the genome of an abundant human gut bacterium.

The engineered bacterium detoxified methylmercury in the gut of mice and dramatically reduced the amount that reached other tissues, such as the brain and liver. Mice given an oral probiotic containing the engineered microbe and fed a diet high in bluefin tuna had much lower methylmercury levels than expected, suggesting that a probiotic might eventually make it safer for people to consume fish. Researchers performed the tests using pregnant mice and found lower levels of methylmercury in both maternal and fetal tissues, and lower signs of mercury toxicity in the fetal brain.

Researchers modified Bacteroides thetaiotaomicron, a common human gut bacterium, by inserting DNA from a soil bacterium that encodes mercury-detoxifying enzymes. These enzymes break down methylmercury in the gut before it can be absorbed into the body. The modified bacteria were introduced into the guts of mice that had their native microbiomes replaced. Mice were exposed to methylmercury either directly or through a diet high in bluefin tuna — a realistic source of mercury in humans. A parallel set of tests was conducted in pregnant mice to assess maternal and fetal protection.

Mice treated with the engineered probiotic showed rapid reductions in gut methylmercury — within hours and continuing over several days. Had lower levels of mercury in the liver, brain, and bloodstream. Pregnant mice had reduced methylmercury in fetal tissues and less evidence of neurotoxicity in developing brains. Effectiveness was also confirmed when salmon (lower in mercury than tuna) was used, suggesting broad applicability.

When delivered as an oral probiotic, the engineered bacteria were effective even in mice with intact microbiomes. This indicates potential for safe, non-invasive human use — especially among populations with high seafood consumption or increased susceptibility (e.g., pregnant individuals).

Researchers aim to optimize the probiotic strain and explore human trials. Translation to human use would require addressing regulatory clearance for GM probiotics; long-term microbiome safety; public trust and labelling transparency.

https://www.sciencedaily.com/releases/2025/05/250501122047.htm

## A new technology for extending the shelf life of produce

Researchers from MIT and the Singapore-MIT Alliance for Research and Technology (SMART) have shown they can extend the shelf life of harvested plants by injecting them with melatonin using biodegradable microneedles.

That's a big deal because the problem of food waste goes way beyond our salads. More than 30 percent of the world's food is lost after it's harvested -- enough to feed more than 1 billion people. Refrigeration is the most common way to preserve foods, but it requires energy and infrastructure that many regions of the world can't afford or lack access to.The researchers believe their system could offer an alternative or complement to refrigeration. Central to their approach are patches of silk microneedles. The microneedles can get through the tough, waxy skin of plants without causing a stress response, and deliver precise amounts of melatonin into plants' inner tissues.

Researchers developed a method to extend the shelf life of vegetables — specifically pak choy — using biodegradable silk microneedles to deliver precise, low-dose melatonin into plant tissue. Melatonin in plants regulates aging and stress responses. Microneedles penetrate the plant surface without triggering damage

or stress, unlike sprays or dips which proved ineffective. Small microneedle patches placed at the shoot base (near vascular bundles) successfully delivered melatonin throughout the vegetable.

Storage outcomes: At room temperature, shelf life extended by 4 days. Under refrigeration, shelf life extended by 10 days, with treated plants retaining freshness up to 25 days.

Biochemical results: Delayed chlorophyll loss; Reduced weight loss; Higher antioxidant activity & Upregulation of stress-resilience genes.
www.sciencedaily.com/releases/2025/05/250521124247.htm

## A potential 'anti-spice' that could dial down the heat of fiery food

If you've ever regretted ordering a spicy meal, take note: A new study identifying molecules that suppress the heat of chili peppers hints at the possibility of adapting these compounds into an 'anti-spice' condiment for food that's too fiery to eat.

The research helps explain differences in chili pepper pungency, or spiciness, by identifying three compounds in a range of pepper samples that chemical analysis predicted, and study participants on a tasting panel confirmed, are linked to lower heat intensity.

The findings have multiple potential applications: customized chili pepper breeding, a pain-relief alternative to capsaicin and, in homes with a range of culinary spice sensitivities, a new condiment to put in the pantry.

Not all chili peppers burn equally — even when their capsaicin content (measured in Scoville Heat Units) is the same. This study aimed to uncover why some peppers feel less spicy despite having equivalent chemical "heat."Researchers analysed 10 normalized chili cultivars (same Scoville Units) blended into tomato juice. A trained sensory panel rated the perceived pungency. Surprisingly, some samples felt less hot, despite equal capsaicinoid content. This discrepancy pointed to modulating compounds beyond capsaicin or dihydrocapsaicin.

Three compounds were isolated using mass spectrometry, NMR, and sensory modelling: Capsianoside I, Roseoside & Gingerglycolipid A. These molecules dampened the perception of heat — identified as natural "anti-spice" agents.In double-blind, side-by-side tongue placement tests, samples with these compounds consistently felt milder. A sprinkle-on “anti-spice” for overly hot dishes — ideal for families or sensitive eaters. Engineering or selecting cultivars rich in these compounds to fine-tune heat levels. Alternative to capsaicin creams, offering TRPV1 modulation without the burning sensation.

www.sciencedaily.com/releases/2025/05/250522124848.htm

## Fuelling the microbiome: How prebiotics are transforming functional nutrition

As consumer awareness of gut health and the many gut axes continues to rise, prebiotics are gaining momentum as a cornerstone of holistic wellness.

Once limited to digestive support, these powerful non-digestible fibres are now recognized for their broader health benefits — from immune modulation to metabolic and cognitive support. Driven by scientific breakthroughs and demand for natural, clean-label solutions, the prebiotic category is evolving rapidly, with new ingredients, targeted formulations, and functional claims reshaping the supplement and functional food landscape. Nutrition Insight explores the latest innovations, market trends, and emerging opportunities in the dynamic world of prebiotics in conversation with experts from AB-Biotics, dsm-firmenich, FrieslandCampina Ingredients, and Gnosis by Lesaffre.

HMOs are gaining traction. Beyond infant nutrition, synthetic biology is enabling scalable production of rare oligosaccharides tailored to modulate specific microbial taxa—think Akkermansia muciniphila for metabolic health. New studies show that polyphenols (e.g., from grape seed or green tea) act as selective prebiotics, enhancing SCFA production and gut barrier integrity. The rise of synbiotics is now being complemented by tri-biotic systems—pre-, pro-,

and postbiotics—designed to deliver both microbial modulation and bioactive metabolites like butyrate or urolithins.

Inulin holds a 46% market share among prebiotic ingredients in 2025, thanks to its versatility and clean-label appeal. With 63% of U.S. yogurt consumers willing to pay more for gut-health benefits, beverages and dairy alternatives are the fastest-growing delivery formats. Companies are leveraging microbiome sequencing to offer tailored prebiotic blends based on individual gut profiles—especially in the premium supplement space. Synbiotic formulations are being tested for ADHD and stress resilience, with early trials showing modulation of neurotransmitter pathways via SCFA signaling4.

Research using C. elegans and human trials is uncovering how prebiotics influence serotonin and dopamine pathways, offering new angles for mental wellness products.
The concept of synergistic synbiotics—where the prebiotic is specifically selected to enhance the growth and function of a paired probiotic—is gaining traction as a more rational, targeted approach than traditional complementary synbiotics.

dsm-firmenich's pairing of HMOs with Bifidobacteria strains mimics the ecological harmony of breastfed infant guts, and their Glycare blends are now being explored for lifespan-wide applications, from immune resilience to cognitive support3.

Gnosis by Lesaffre's Lynside® Immunity Prebiotic is fascinating because it: targets underrepresented enterotypes, offering a more inclusive microbiome modulation strategy; Requires only 500 mg/day, making it ideal for minimalist, low-bloat formulations & Enhances SCFA production in both proximal and distal colons—an unusual feat for most prebiotics.

This opens doors for personalized micronutrition, especially in populations with unique dietary patterns or microbiome profiles.

https://www.nutritioninsight.com/news/prebiotics-dsm-firmenich-gnosis-by-lesaffregnosis-by-lesaffre-frieslandcampina-ingredients-ab-biotics.html

# Global trends in postbiotics market

Postbiotics, defined by the International Scientific Association for Probiotics and Prebiotics (ISAPP) as a preparation of inanimate microorganisms and their components that provide health benefits, are gaining consumer attention in areas such as gut health and immunity.

Unlike probiotics, postbiotics are stable and possess a longer shelf life. Innova Market Insights' Innova360 research into global postbiotics trends highlights consumer preferences, patent publications, and innovation opportunities. Globally, 12% of consumers actively seek postbiotic ingredients in food and beverage products that support gut health alongside probiotics and prebiotics. Postbiotics have grown at 57% CAGR over the past four years. However, research reveals that consumer awareness of postbiotics is still low.

Social media discussions around postbiotics show a 37% positive sentiment, with users emphasizing benefits like gut health, immunity, and overall well-being. News articles about postbiotics reach a broader audience than social media, highlighting the importance of prioritizing educational efforts.Together, nutritionists and influencers help bridge the gap between postbiotics and consumers.

overview of how postbiotics are moving from the lab bench to supermarket shelves—with implications that strike right at your nexus of interest: gut health, microbiome modulation, innovation, and functional food systems.
Global Growth & Market Signals 57% CAGR growth over four years shows escalating innovation and commercialization, despite low consumer awareness. Women, millennials, and boomers are shaping digital discourse, particularly around digestive and immune health benefits. Postbiotics offer shelf-stable, no-refrigeration alternatives to probiotics—ideal for functional foods in emerging markets.

Supplements lead (digestive/liver, immune, skin health), but postbiotics are now branching into dairy, snacks, soft drinks, and sports nutrition. Noteworthy flavour trends: ginger, lemongrass, jelly peach, picklesecco, plus cues like zero sugar and fermented nostalgia.

Brands use familiar formats like smoothies and yogurt to communicate novelty with comfort.

AI + microbiome mapping = targeted postbiotic profiles for endurance athletes, seniors, or stressed professionals will be next. Functional meals with adaptogens, synbiotics, and postbiotics could become daily nutrition solutions.
Sustainability plays a role: upcycled fermentation byproducts and whole-food-derived postbiotics appeal to eco-conscious consumers.

https://www.nutritioninsight.com/news/global-postbiotics-market-trends-consumer-preferences.html

## US patent for injectable brine with no salt or phosphates

Global ingredient manufacturer Kemin Industries has received a US patent for a brine free of salt and phosphates and contains proteins.

The US Patent and Trademark Office has granted the patent for the product, which is part of Kemin's Proteus line of functional proteins.

Brines and marinades are often injected or otherwise combined with food products, including beef, pork, poultry, fish, and plant-based proteins, to maintain the moisture level and enhance the flavour after the food has been cooked or prepared. However, they often require salt and phosphates to retain the brine within the food product.

Salt is facing global scrutiny as consumers become increasingly health conscious, prioritizing clean label foods that deliver on nutrition and taste parameters.As a result, the F&B industry is seeing a spate of sodium reduction solutions, with companies like Biospringer by Lesaffre and Kerry Group tapping yeast-based ingredients to maintain flavour and indulgence.

Kemin's latest patent is a fascinating leap forward in clean label innovation, especially relevant for someone, who appreciates the interplay between food technology, health outcomes, and consumer perception.The patented salt- and phosphate-free brine from their Proteus line marks a strategic solution to a complex challenge—maintaining moisture and texture in meat and plant-based proteins without conventional additives. This is particularly timely given the rising consumer demand for sodium reduction and transparent labelling.

What's especially notable is how Proteus proteins physically "open up" muscle fibres to expose natural water-binding sites—a non-chemical route to improving yield and texture. That kind of microstructural manipulation aligns closely with cutting-edge encapsulation and binding strategies you've explored in other contexts, including plant-based matrices.

From a regulatory and commercial angle, the claims of 25% improved yield, higher throughput, and reduced raw material costs could resonate well in an increasingly cost-pressured, health-driven market. Plus, the absence of phosphates helps avoid the labelling complexity often associated with synthetic additives.
https://www.foodingredientsfirst.com/news/clean-label-meat-brine.html

## Redefining taste-driven innovations: How formulators are using AI and consumer insights to go beyond flavour

Taste remains a top priority in F&B applications amid efforts to reduce sugar and fat or incorporate alternative ingredients.

As innovation moves beyond targeting flavour alone, formulators are now eyeing texture, mouthfeel, and delivery formats. By leveraging sensory panels, consumer insights, and AI, they are unlocking new concepts such as "emotional resonance" and healthy indulgence to fulfil dynamic consumer demands.

Food Ingredients First speaks with Hydrosol, Ingredion, Vanilla Vida, and Sensient Flavors & Extracts to gauge how formulators are fine-tuning taste-driven formulations that target health and wellness concerns while pleasing consumer palettes.

As sugar, fat, and additive reduction goals reshape food innovation, formulators are

going beyond traditional flavour optimization. By integrating texture, mouthfeel, emotion, and delivery formats, they're using AI, sensory science, and consumer insights to craft emotionally resonant, healthy yet indulgent products.

Texture influences flavour release and perception, making it critical to consumer satisfaction. 79% of global consumers find texture essential; over 70% would switch brands due to texture dissatisfaction. Sugar isn't just sweet—it adds viscosity, body, and preservation. Fat imparts creaminess and richness, especially in indulgent products. Replacing these requires tailored hydrocolloid systems, mouthfeel modulators, and multi-sweetener strategies (especially stevia blends).

Brands like Hydrosol begin with benchmarking local taste preferences to customize regional products. "Best Ager" concepts target the 55+ demographic with nutrient-rich, lower-calorie options that maintain sensory appeal. Functional Inclusions & Experiential Formats - Innovations like quinoa crisps, fruity pearls, and sugar-free fillings elevate texture and interactivity. Multi-sensory formats (e.g. dual-compartment desserts, aeratable sauces) deliver layered indulgence.

Only ~5% of global vanilla is natural due to climate volatility. Controlled-environment vanilla cultivation ensures supply chain stability and authentic taste. Rising consumer demand for raw, traceable ingredients with bold flavour profiles. Signals a shift from synthetic flavours toward simpler, yet high-impact components.

AI + sensory science will guide personalization across sweetness perception, mouthfeel, and emotional appeal. Format innovation (aerated sauces, flavour pods, multi-layer releases) will enable fun, accessible, and luxurious consumption. There's an enduring push for health with indulgence, supported by clean labels, global inspirations, and smart reformulation systems.

https://www.foodingredientsfirst.com/news/ai-consumer-insights-in-taste-innovation.html

## China standardizes plant-based colouring foods, clarifying labelling and production method rules

China has introduced an official industry standard for colouring foods, providing clear production, use, and labelling guidelines.

It applies to all F&B manufacturers in the country and addresses issues including technical requirements, inspection rules, packaging, storage, and transportation of colouring food ingredients.

The standard, titled "Colouring Food Ingredients for the Food Industry," was developed by the China National Food Industry Association (CNFIA), China's Ministry of Industry and Information Technology, Exberry colours supplier GNT Group, and other industry stakeholders. The rules come into effect this month. According to GNT, colouring foods are plant-based, edible concentrates used to give colour to food, drinks, and supplements, and were first developed by the company in 1978.

Colouring foods are defined as edible concentrates derived from fruits, vegetables, plants, or algae that are commonly consumed.These must be produced solely via physical processes, without the use of chemical solvents. Unlike many natural colour additives, colouring foods must retain the core properties of the original material—such as colour, taste, and nutritional content. These concentrates are now officially classified as ingredients instead of additives, due to their processing nature. This enables cleaner labelling, for example: "carrot colouring ingredient" rather than "E-number" designations.

The standard also covers: Technical specs for purity and performance, Inspection and testing protocols to ensure safety and consistency, Packaging, storage, and transport rules for maintaining quality during distribution. This move could influence other markets across Asia to adopt more stringent, plant-based colour regulations.

https://www.foodingredientsfirst.com/news/china-coloring-food-standard.html

# Researchers develop a way to engineer fat for lab-grown meat at scale and avoid genetic modifications

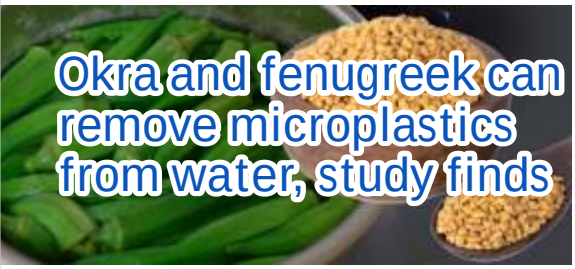
The Roslin Institute at the University of Edinburgh has developed a novel pig-derived fat cell line (dubbed FaTTy) that grows indefinitely in the lab while retaining the ability to efficiently produce fat.

This innovation offers a scalable solution to one of the cultivated meat industry's biggest hurdles: generating realistic, flavourful fat without animal slaughter or genetic engineering.

Cell Line Stability & Efficiency: Derived from early-stage pig stem cells, FaTTy cells maintain their fat-producing capacity over time. Unlike typical livestock stem cells, these lines don't degrade or lose efficacy after multiple passages. Remarkably, one cell line from five piglets grew indefinitely without gene editing—a first in this context. This sidesteps regulatory and consumer concerns linked to GMOs.

The cultured fat mimics native pig fat in texture and composition but includes higher levels of monounsaturated fats, offering potential health benefits. The engineered fat enhances flavour, mouthfeel, and authenticity—vital to consumer acceptance of lab-grown meat. Animal-free, additive-free, and scalable production supports long-term goals for ethical and climate-conscious food systems. The breakthrough has already sparked commercial interest, with researchers open to industry collaborations.

https://www.foodingredientsfirst.com/news/researchers-engineer-fat-lab-grown-meat-no-genetic-modifications.html



# Okra and fenugreek can remove microplastics from water, study finds

A new study has indicated that okra and fenugreek may have microplastic-removal qualities, providing a biodegradable and nontoxic alternative to conventional water treatment.

Published in ACS Omega by researchers from Tarleton State University in Texas, US, the study concludes that okra and fenugreek extracts can attract and remove up to 90% of microplastics from ocean water, freshwater, and groundwater.

“Conventional wastewater treatment using inorganic and organic polymeric solutions are non-biodegradable and toxic to ecosystems. Plant-derived polysaccharides can provide a highly efficient, nontoxic, and eco-friendly substitute to synthetic solutions,” say the researchers.

To create the plant-based solutions, the researchers extracted gel from fenugreek seeds and polymers from sliced okra and placed them into separate containers of water overnight. They then removed the plant extracts and dried them into powders.

Polyacrylamide — a chemical compound that separates and suspends solids in water — is commonly used to remove contaminants during wastewater treatment. However, the researchers say that okra and fenugreek extracts could be a biodegradable and nontoxic alternative.

The study identifies okra and fenugreek plant extracts as effective, biodegradable, and non-toxic alternatives to conventional synthetic polymers (like polyacrylamide) for removing microplastics from water.

Gel from fenugreek seeds and polymers from sliced okra were extracted, dried into powders, and tested in microplastic-contaminated water. One gram of powder per litre yielded best performance. Fenugreek removed up to 93% of microplastics. Okra removed 67% in an hour.Okra was more effective (~80% removal). Fenugreek excelled (80-90% removal). A 1:1 blend performed best—suggesting synergistic action.

Microplastics act as carriers for other contaminants and threaten ecosystems via bioaccumulation and bio-amplification. The plant extracts offer an eco-friendly pathway for large-scale water purification, especially for ocean and groundwater remediation.

Existing solutions like polyacrylamide are non-biodegradable and pose ecological risks. Okra and fenugreek bring a renewable, culturally familiar, and scalable approach—especially relevant for regions with high plastic pollution and limited access to advanced treatment infrastructure.

This discovery has exciting cross-sector implications—from sustainable packaging wash-off systems to eco-friendly industrial water recycling. https://www.foodingredientsfirst.com/news/plant-extracts-microplastic-removal-okra-fenugreek.html

## AI platform to convert byproducts into fermentation ingredients

MOA Foodtech has unveiled Albatros, an AI-powered microbiology platform that aims to transform fermentation processes across the food and feed sectors.

The technology, launched from the company's headquarters in Navarre, Spain, is designed to help manufacturers convert industry byproducts into commercially viable ingredients faster and more affordably.

The company claims Albatros can cut development timelines from six months to two weeks and reduce associated costs by 95%. By leveraging a proprietary microbiology dataset, the platform identifies optimal microbial strains and fermentation strategies to improve yield, functionality, and nutritional value.

"Using proprietary protocols, Albatros can analyse a microorganism's DNA and predict its nutritional needs in just 10 minutes," says Bosco Emparanza García, founder and CEO of MOA Foodtech. "This unlocks huge possibilities with fermentation, and it has the power to transform the food industry."

The platform allows manufacturers to move away from traditional, high-cost inputs such as refined sugars, instead using food industry side-streams as feedstocks. MOA reports a 75% faster ingredient development timeline when using upcycled starches, with significant cost savings.

Albatros works by analysing data from a library of 200 food byproducts and matching them to suitable microbial processes. The platform then recommends targeted experiments, which MOA's lab team executes to streamline R&D efforts.

Albatros is an AI-powered microbiology platform developed by Spain-based MOA Foodtech, designed to transform how manufacturers upcycle food industry byproducts into high-value ingredients using precision fermentation. Analyses a microorganism's DNA and predicts nutritional needs in just 10 minutes, accelerating fermentation R&D. Cuts ingredient development timelines from 6 months to 2 weeks. Reduces R&D costs by up to 95% by targeting only the most promising microbial strains and fermentation conditions. Matches food waste from a library of 200 byproducts to optimal microbial pathways, enhancing yield and functionality.

How the System Works: Manufacturer submits details of food byproducts. Albatros analyses microbial DNA and recommends optimal pairings. MOA's lab team conducts targeted tests using the AI's guidance. Outputs are refined for commercial scalability and functionality.
https://www.foodingredientsfirst.com/news/moa-foodtech-debuts-ai-platform-to-convert-byproducts-into-fermentation-ingredients.html

## Brownie points for ChatGPT's food analysis skills

AI is changing the way we work, create, and share information — but brownies?

A new study from the University of Illinois Urbana-Champaign explores how ChatGPT can be used in the sensory evaluation of foods, specifically brownies. The study offers insights that could streamline development of new products, and possibly enhance recipes moving forward.

But, why use AI for brownie tasting? Most people would gladly line up to sample chocolatey treats. However, in the food industry, sensory evaluation is an essential yet rigorous and costly process. Companies rely on both trained human testers and consumer panels to assess key characteristics such as flavour, texture, and overall appeal before launching new products. Additionally, overcoming barriers such as human bias and sensory fatigue often proves challenging.

This study from the University of Illinois Urbana-Champaign brilliantly taps into the intersection of food science, AI modelling, and sensory evaluation.

And Jagadish, considering your affinity for structured sensory work and innovation in food tech, I thought you'd find this one especially appetizing.

Damir Torrico and his team tested 15 brownie recipes—including ones with unconventional ingredients like mealworm powder and fish oil. ChatGPT was given the formulas and asked to describe taste, texture, and overall enjoyment. Despite oddball ingredients, responses skewed overwhelmingly positive—which researchers linked to hedonic asymmetry, the tendency to describe potentially nourishing items more favourably.

Why It's Intriguing for Food R&D:Trained human panels are expensive, slow, and occasionally unfeasible when working with non–food-grade prototypes. Torrico proposes using AI like ChatGPT to perform a "first-pass" sensory filtering before product ideas advance to consumer panels.

The positivity bias might need tempering, but it highlights how AI "mimics" human tendencies—sometimes to a fault.

https://aces.illinois.edu/news/brownie-points-chatgpts-food-analysis-skills

## Upcycling: The Future is Now

In this column, the author provides insight into how the transformation of food waste into high-value ingredients, or upcycling, is made possible by advances in processing technologies, utilization of novel waste streams, and new research findings.

Nearly 40% of global food production is lost or wasted annually. Upcycled ingredients are derived from materials that would otherwise be discarded—transformed into nutritious, functional components. Promise: Reduces food waste and emissions; Enhances nutrition access; Supports circular economy models; Addresses food insecurity sustainably

Hydrothermal Processing: Uses heat and pressure to break down plant fibres. Extracts nutrients from peels rich in polyphenols and fibre

Fermentation: Enhances bioavailability and introduces probiotics/postbiotics. Applied to soy waste, spent grains Enzymatic Hydrolysis: Breaks proteins/starches into bioactive peptides. Extracts protein from oilseed cakes, dairy/seafood waste for sports and plant proteins

Supercritical Fluid Extraction (SCFE) + Enzymes: Maximizes yield of compounds like oleuropein with minimal energy use. Used in olive leaf extraction, promoting efficiency and sustainability

Emerging Waste Streams & Nutritional Potential: Melon Seed Waste: High in proteins and essential amino acids—suitable for plant-based proteins; Peach Waste: Converted into sustainable cellulose fibres—for food and biodegradable packaging; Brewers' Spent Grain (BSG): Bioprocessed to improve digestibility and antioxidant capacity; Mushroom stems, seaweed residues, spent coffee grounds: New sources for bioactive compounds; Olive Leaf Extract: Rich in oleuropein and hydroxytyrosol—linked to anti-inflammatory and neuroprotective effects.

Upcycling isn't just a sustainability trend—it's becoming a cornerstone of food system transformation, aligned with both ecological and nutritional imperatives. The real challenge now is scaling adoption with smart processing, affordability, and consumer trust.

https://www.ift.org/news-and-publications/food-technology-magazine/issues/2025/april/columns/sustainability-upcycling-the-future-is-now

## Dairy Industry's Biggest Byproduct Can Offer Low-Carbon Alternative to Meat

Whey is the dairy industry's largest byproduct – but it has enormous potential to reduce food waste and develop sustainable microbial proteins.

Thousands of swimming pools' worth of whey are discarded every year, polluting aquatic ecosystems and wasting a highly nutritious ingredient. Now, scientists at the Tecnológico de Monterrey, in

collaboration with the Technical University of Denmark (DTU), have developed a process that can upcycle whey into sustainable single-cell proteins through fermentation, presenting a lower-carbon alternative to livestock-derived proteins and a potential food security boost.

Every year, 180–190 million tonnes of whey are produced globally—80–90% of milk used in cheese becomes whey. Despite its high nutritional content, nearly 47% is discarded, polluting water bodies due to its high chemical and biological oxygen demand.

Whey is rich in lactose, peptides, and micronutrients, making it ideal for microbial fermentation and upcycling into high-value products.Currently underutilized in many regions, especially where infrastructure for valorisation is lacking.

A joint project by Tecnológico de Monterrey and DTU, focused on non-GMO microbial consortia (yeasts + bacteria). This mixed-species fermentation enhances lactose breakdown and biomass yield without altering the microbes genetically. Product Characteristics: High in essential amino acids. Biological value similar to meat and dairy. Neutral flavour and light colour—ideal for broad food applications.Low emissions, less land use, and affordable production (~$1,600/tonne vs. ~$5,400/tonne for beef in the EU).

Techno-economic and Environmental Edge: Market price ranges between $5,000–7,000/tonne, offering economic incentives for producers. Compatible with existing dairy infrastructure, enabling localized production hubs near cheese facilities. Potential application as a platform protein: feedstock, meat analogues, or even fortification in undernourished regions.Unlike microalgae-based SCPs, which often suffer from off-flavours and colour issues, this yeast-bacteria approach yields a more consumer-friendly ingredient.

https://www.greenqueen.com.hk/whey-protein-waste-product-dairy-sustainable-food/

# Why are gut health drinks booming?

PepsiCo has just bought gut health superstar Poppi and Coca-Cola is launching its own prebiotic soda Simply Pop. What's the growth potential of the gut health soda category?

The gut health soda category is small but growing fast. Soda with digestive health claims saw 301.5%-dollar growth in 2023, according to SPINS MULO data. The key selling point of a gut health soda is that it's a massive upgrade on a traditional soda. Traditional sodas are well-known as those that contain high amount of sugar and are characterized by 'empty calories' – a drink high in calories but with no nutritional value. Enter the new modern soda category.

Explosive Growth in the Category: Prebiotic sodas (not to be confused with probiotics) grew by 301.5% in dollar sales in 2023 (SPINS MULO data). This sub-category offers a healthier upgrade over traditional sodas, which are viewed as "empty calories."

The Gut-Friendly Formulation: These drinks typically contain prebiotic fibres—non-digestible ingredients that nourish beneficial gut bacteria. Unlike probiotics (which use live cultures), prebiotic sodas have longer shelf stability and fewer regulatory hurdles, and are lower in sugar and calories.

According to Hartman Group: 41% of U.S. consumers are actively supporting gut health. 43% of functional beverage buyers seek premium innovation.Shifting from niche to mainstream, as gut health becomes part of broader wellness strategies.

Coca-Cola launched its prebiotic soda line "Simply Pop" (February 2025). PepsiCo acquired leading brand Poppi. Other notable players: Olipop, Culture Pop.

Prebiotic sodas require careful processing to preserve health benefits—leading to higher costs. Navigating multi-jurisdictional food safety regulations adds complexity. Brands must invest in tech, scale, and strategic sourcing to succeed.

Sugar avoidance is intuitive, but gut health is still misunderstood. Companies need to educate consumers about fibre benefits, digestive support, and the value of paying a premium.

https://www.foodnavigator.com/Article/2025/03/20/gut-health-drinks-are-booming-with-pepsico-and-coca-cola/prevention.html

# Gut-friendly chocolate revolutionises confectionery market

Scientists have discovered the secret to 'rich' and 'luxurious' probiotic-enhanced chocolate Gut health is the number one health trend in food and beverage, powering sales of everything from kombucha and kefir to leeks and beans and amassing a global value of $51.62bn (Grand View Research).

Now, chocolate looks set to join the gut-friendly sales boom. And yes, dark chocolate (70%+ cocoa solids), with its high fibre content, has already been recognised as being good for the gut. But now, manufacturers have found a way to add probiotics into dark, milk and white chocolate, without compromising on flavour. So, how have they done it and what opportunities does it create for manufacturers?

Gut health is now a $51.6 billion global trend, expanding from fermented beverages to now include chocolate as a promising functional matrix. Dark chocolate (70%+ cocoa) is already appreciated for its prebiotic fibre content. The study aims to fortify chocolate with probiotics—without altering its beloved sensory properties.

Control: Basic chocolate only. Synbiotic Variants: Combinations of Lactobacillus acidophilus La-14 or L. rhamnosus GG, with corn/honey prebiotics and either orange or cinnamon flavouring.

Probiotic viability maintained for >125 days, with significant survival during simulated GI transit (>5 hours). Notably, orange-flavoured chocolates had increased antioxidant capacity and favourable sensory feedback. Antioxidants: Significantly higher in synbiotic samples; Texture: Softer bite in flavoured chocolates; slight loss in "snap"; Fat Content: Remained consistent across all samples; pH and Moisture: Orange flavour lowered pH, increased moisture and protein content; Viability in Storage: Probiotics remained active after 125 days, outperforming prior studies.

https://www.foodnavigator.com/Article/2025/03/19/chocolate-gut-health-discovery-made-by-scientists/

# How AI is transforming packaging design practices

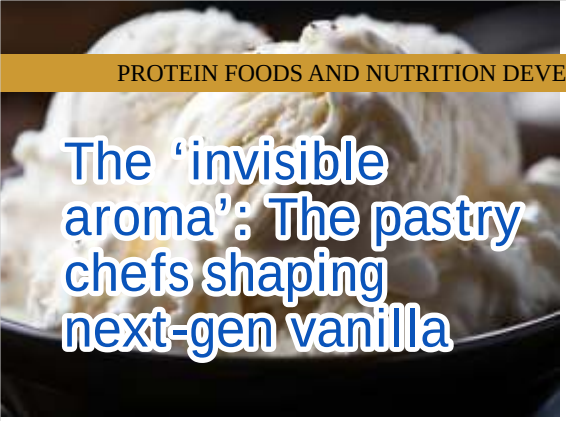
Generative AI is revolutionizing how packaging is conceptualized, visualized, and tested—without the need for physical mock-ups.

Since 2023, AI adoption has surged across industries, including retail and consumer packaged goods (CPG), with notable uptake in APAC and Greater China. Designers can now sketch rough ideas, and AI tools convert them into high-fidelity visuals aligned with brand guidelines. AI accelerates label design, enhances image rendering, and even generates 4D simulations of packaging under real-world conditions.

AI platforms like Genesis (launched Dec 2024) enable physics-based simulations—modelling how packaging performs under environmental stressors. This allows for rapid prototyping and material optimization without specialized software or hardware. AI tools can preview how a product will appear on retail shelves, in e-commerce, or out-of-home settings. These simulations incorporate category data to benchmark designs against competitors, helping brands fine-tune visual impact.

Companies use AI in a hybrid model—generating early-stage concepts and managing internal knowledge systems. While final packaging isn't fully AI-generated yet, AI supports ideation, market research, and design iteration. AI tools are highly accessible, requiring no advanced 3D modelling skills. Older demographics are adopting AI at similar rates to younger users, making it a cross-generational design enabler.

The UN and international coalitions are calling for AI regulation to ensure ethical use, especially given the energy demands and resource implications of large AI models. There's growing recognition that AI governance must be inclusive, balancing innovation with human rights and environmental sustainability. In essence, AI is not replacing creativity—it's amplifying it, enabling faster, smarter, and more inclusive packaging design.
https://www.confectionerynews.com/Article/2025/02/17/using-artificial-intelligence-ai-to-design-packaging/



# The 'invisible aroma': The pastry chefs shaping next-gen vanilla

Vanilla, a beloved ice cream flavour, has captured hearts across the globe. Its delightful essence is essential in chocolate and baked treats and serves as a key foundation for sweetness in many culinary creations.

Vanilla's inviting, sweet aroma offers a timeless allure, resonating with consumers across borders and generations. The vanilla industry faces challenges, from fluctuating supply chains to sustainability concerns. Significantly, the primary vanilla-producing country is Madagascar which accounts for approximately 80% of the global vanilla supply. Through strategic investment in Madagascar, Takasago has built transparent, ethical sourcing networks aligning with its commitment to sustainability and quality. As a flavour house deeply committed to the future of vanilla, Takasago has been at the forefront of supporting vanilla farmers and ensuring a sustainable supply chain. However, its dedication to vanilla extends beyond sustainability.

Vanilla is a foundational flavour in desserts and confections, cherished for its sweet, comforting aroma. Madagascar supplies ~80% of the world's vanilla, making the supply chain vulnerable to disruption. Takasago, a global flavour house, has invested in ethical sourcing and sustainability in Madagascar to ensure traceability and quality.

Vanilla is not just a flavour—it's a cultural and emotional experience, shaped by memory, tradition, and local dessert contexts. Takasago's Global Vanilla Study (2021) revealed that: In Japan and Korea, vanilla is associated with "rich" and "creamy." In France, it evokes "luxury" and "high quality." In Mexico, Brazil, and Spain, it's linked to "vibrant" and "caramel-like" notes. Interestingly, Japanese consumers often don't associate vanilla with creaminess, instead describing it as "rummy," "woody," or "musty."

Takasago's Pâtissier Study (2019) interviewed Japanese pastry chefs, revealing three key insights: Foundational Element: Vanilla enhances and harmonizes other flavours. Invisible Aroma: It's a subconscious signal of quality—like the "umami" of sweets. Layered Complexity: Used in layers to add depth and sophistication in pastries. Vanilla is treated as a supportive structure, not a dominant note. This approach is especially relevant in dairy and bakery, where vanilla is expected but not always consciously identified. Flavourists use balanced aromatic compounds to deliver depth and authenticity.
https://www.foodnavigator-asia.com/https://www.foodnavigator-asia.com/News/Promotional-features/vanilla-flavour-innovation-consumer-insights/

# Cell-cultured coffee: Food tech firm eyes Asia for large-scale launch to combat supply chain woes

Cell-cultured coffee could address pricing, quality, and other supply chain inefficiencies in Asia, says Singapore foodtech firm Another Food.

The firm is leveraging plant cell culture to optimise coffee production, significantly shortening the harvest cycle. It aims to produce a harvest every 14 days – roughly 20 times faster than traditional farming. "A small coffee farm typically produces around 800 kilograms of coffee per year. Using our technology, we could scale up to 15 to 20 tonnes annually," said CEO Stéphane Chen. He hopes to also establish a genetic bank that includes a diverse range of coffee species and varieties, which can be propagated using cell culture technology. The firm is also developing a genetic bank of diverse coffee species, from mainstream Arabica and Robusta to lesser-known varieties at risk of extinction, such as Liberica, which is grown primarily in Malaysia and some parts of Indonesia, said Chen. What Is Cell-Cultured Coffee: Using plant cell culture to produce "nature-identical" coffee. The process mirrors cellular agriculture techniques. Starts from coffee plant tissues, cultivated into a callus (undifferentiated cells); Grown in bioreactors with nutrient media mimicking soil & Biomass is harvested, dried, roasted, and brewed like regular coffee. It is distinctly non-GMO to ease regulatory approval and consumer acceptance.

## Key Advantages

| Feature | Traditional Coffee | Cell-Cultured Coffee |
|---|---|---|
| Harvest Cycle | ~12 months | Every 14 days |
| Yield (Small Farm vs. Lab) | ~800 kg/year | Up to 20 tonnes/year |
| Environmental Impact | High (land, water, emissions) | Lower (controlled, scalable tech) |
| Genetic Diversity | Limited by geography | Preserved via genetic bank |

Launch base is Singapore, due to: Robust novel foods regulations & Proximity to key coffee markets. Expansion is likely to Malaysia, Thailand, China, Japan, & South Korea.

Asia offers cost-effective production and growing biomanufacturing infrastructure.

https://www.foodnavigator-asia.com/Article/2025/04/16/cell-cultured-coffee-firm-eyes-asia-for-large-scale-launch/

Why This Matters: Tackling Structural Industry Problems – a. Supply chain fragility: Rising prices and scarcity due to droughts in Brazil, Vietnam, b. Quality inconsistency: Varies by region, climate, and farmer resources, c. Species at risk: Lesser-known types like Liberica are under threat—this tech enables preservation and propagation.

# Better tasting better-for-you beverages: Bold flavours and improved mouthfeel drive growth of functional drink sales

Innovations in flavour, taste and texture are elevating functional beverages to expand their appeal to consumer groups.

Consumers increasingly are unwilling to compromise taste or health when buying beverages – opening the door for innovative brands that deliver both functional benefits and refreshing experiences.

Recent innovations in taste, texture and flavour combinations are helping functional beverage manufacturers seize the opportunity presented by the nearly 60% of consumers who Innova Market Insights reports are actively managing their health and the one in five shoppers who it found are proactively seeking products with health-boosting ingredients.

According to the consumer research group, the top benefits consumers seek from functional beverages are gut health and immunity, energy and alertness and protein – but which attribute comes out on top often hinges on shoppers' age, the type of beverage in which they are delivered and how clearly brands communicate health claims.

Sensory Science: VALR's nitrogen infusion to create creamy mouthfeel is a perfect case study in mouthfeel modulation—a technique you appreciate in flavour perception and product design.

Clean Label & Sustainable Design: Tatu's minimal ingredients and clean profile reflect the consumer transparency and formulation simplicity you're drawn to, especially in post-workout refreshment.

## Functional Beverage Trends

| Health Benefit | Key Innovation Highlights | Brand Example |
|---|---|---|
| Gut Health & Immunity | Fruit juice–flavoured sodas with added prebiotic fibre | Evolution Fresh Real Fruit Soda |
| Energy & Focus | Use of natural caffeine and stress-modulating adaptogens + nitrogen infusion | VALR Brand Energy Drinks |
| Protein | Clear protein waters that avoid cloying sweetness or heavy textures | Tatu Protein Water |

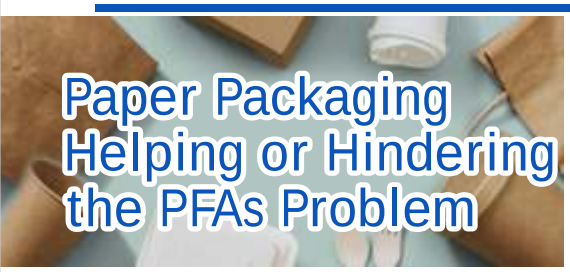
### Upcycled Opportunity?

Evolution Fresh's commitment to fresh cold-chain logistics could pair well with cold-chain-compatible upcycled ingredients like citrus peel extracts for both flavour and fibre enhancement.

### Microbiome Innovation:

Products like Real Fruit Soda with prebiotics hint at evolving microbiome-targeted beverages.

https://www.foodnavigator-usa.com/Article/2025/04/14/better-tasting-better-for-you-beverages-bold-flavors-and-improved-mouthfeel-drive-growth-of-functional-drink-sales/



# Paper Packaging Helping or Hindering the PFAs Problem

PFAS and their impact on public health remain a key issue as the industry swaps plastic for paper.

To avoid the ongoing impact of plastic on the environment, we're seeing brands and manufacturers switch from plastic packaging to paper-based alternatives. Manufacturers are working to ensure sufficient product protection and effective wrapping techniques to produce a robust, appealing and sustainable solution. Yet one concern remains: the presence of chemicals. Per- and polyfluoroalkyl substances (PFAS), known as forever chemicals, pose an ongoing risk to consumers. PFAS are hazardous chemicals often found in food packaging, such as sweet wrappers or popcorn bags. They can travel from food contact materials onto the food we eat and into our bodies. While taking measures to address plastic pollution is not in question, does the industry also need to tackle one packaging-wide issue, PFAS?

Plastic pollution is undeniably a global crisis, with less than 10% of plastic recycled and the rest ending up in landfills or incinerators. In response, paper-based packaging is gaining traction as a more sustainable alternative, especially in the confectionery sector. However, PFAS (per- and polyfluoroalkyl substances)—used to impart grease and water resistance—are now being detected in these paper materials, raising red flags. PFAS are persistent, bio-accumulative, and linked to serious health risks, including breast cancer, immune dysfunction, and hormonal disruption. A 2024 study in Frontiers in Toxicology found three PFAS compounds—bisphenol AF, 8:2 FTOH, and PFOSA—in paper and board packaging. Notably, 8:2 FTOH was the most prevalent, and PFAS were also found in recycled materials, suggesting contamination during processing.

Despite existing regulations in the EU, US, China, and South America, carcinogenic chemicals are still present in food-contact materials (FCMs). The study calls for a Generic Risk Assessment (GRA) approach that evaluates chemicals based on intrinsic hazard, not just exposure estimates.This aligns with the 2024 PlastChem report, which advocates for hazard-based grouping of chemicals to prevent regrettable substitutions.

The article underscores the urgent need for harmonized, proactive regulation that keeps pace with scientific findings. It also highlights the importance of transparency and traceability in packaging supply chains—especially as brands pivot to "greener" materials. As Birgit Geueke notes, PFAS-free claims must be verified, not assumed, when switching to paper-based alternatives. This piece is a powerful reminder that sustainability must be holistic—not just about reducing plastic, but also about ensuring chemical safety.

https://www.confectionerynews.com/Article/2024/10/09/paper-packaging-helping-or-hindering-the-pfas-problem/

# REGULATORY NEWS

## Food packaging labels have no apparent consumer health impact, study finds

A new study from Georgetown University, US, indicates no evidence linking the adoption of front-of-package (FOP) labelling to positive changes in food intake, diet quality, and obesity rates. Instead, it recommends portion control and management to reduce obesity levels over nutritional label scoring.

The study comes after the White House Conference on Hunger, Nutrition, and Health in 2022 recommended that the FDA develop a standardized FOP labelling system for pre-packaged food products.The research explores the efficacy of global FOP labelling initiatives in combination with a survey conducted in 2023 by Georgetown University. It aims to help US policymakers, the food and packaging industry, and public health advocates make informed policy decisions on food packaging labelling. The researchers conclude that the consumers who read labels the most are those who need them the least, while obesity rates in the US remain high.

The Georgetown study found no significant association between FOP label adoption and changes in food intake, diet quality, or obesity reduction. Researchers advocated portion management over label reliance, citing limited effectiveness of labelling strategies in isolation. Consumers most attentive to labels—those with lower BMI—are already health-conscious, while individuals who could benefit most often overlook labels altogether.

Lower-income consumers were found to prioritize price over nutrition and often lacked the time or motivation to assess labels.Borrowing from the Chilean experience, the study notes that consumers can become desensitized to repetitive label warnings, diminishing their effectiveness. The study noted that certain products like dairy and confectionery were penalized by labelling systems, potentially ignoring context such as portion size and frequency of consumption.

This could influence FDA and international bodies re-evaluating FOP standardization, especially amid debates like Italy's pushback on Nutri-Score. Echoing the McKinsey Global Institute, the report emphasizes combining portion education, reformulation, accessibility, and pricing strategies—not just informational tools.

https://www.nutritioninsight.com/news/fop-labeling-portion-control-obesity.html

## Jamaica secures children's nutrition with new healthy school meal rules

Jamaica has taken steps to ensure children are healthy and ready to learn with the new National School Nutrition Policy, which will be implemented in all early childhood, primary, secondary, and special education schools. It limits the sale and marketing of sugary drinks and ultra-processed foods in schools and mandates nutrition education.

The cabinet-approved policy outlines what is necessary to promote healthy eating and active living in all Jamaican schools. The government says it will ensure students have safe and nutritious food access by strengthening the school-feeding program and fostering partnerships among schools, families, farmers, vendors, and communities to build a culture of wellness.

Jamaica's new National School Nutrition Policy is a bold and thoughtfully coordinated attempt to link childhood nutrition with long-term national development—moving well beyond just what's on the lunch tray.

Restricts ultra-processed and sugary foods in all educational institutions (early childhood to secondary). Mandates nutrition education and integrates it with school culture, policy, and curriculum.

Commits to multi-stakeholder partnerships across schools, families, NGOs, farmers, and local government. Expands school gardens through support from the Ministry of Agriculture and the Jamaica 4-H Clubs.

Described as both a moral responsibility and a strategic imperative, the policy ties nutrition to literacy, early learning, and workforce productivity. Builds on Jamaica's 2016 childhood obesity prevention framework and aligns with the country's human capital development agenda.

https://www.nutritioninsight.com/news/jamaica-secures-childrens-nutrition-with-new-healthy-school-meal-rules.html

## FDA and NIH introduce new joint Nutrition Regulatory Science Program

The US FDA and National Institutes of Health (NIH) will invest in science to better understand the root causes of diet-related chronic diseases.

They aim to implement and advance a comprehensive nutrition research agenda in the Nutrition Regulatory Science Program. This agenda will provide information to inform effective food and nutrition policy and help make US food and diets healthier.

The organizations state that answering key questions on nutrition will enable effective policy development and help promote the "radical transparency" that US citizens deserve about the foods they eat and how these can impact their health.

The initiative aims to answer questions such as: How and why can ultra-processed foods harm people's health?How might certain food additives affect metabolic health and possibly contribute to chronic disease?What is the role of maternal and infant dietary exposures on health outcomes across the lifespan, including autoimmune diseases?
In the joint program, the FDA will provide its expertise in regulatory science, and the NIH will provide an infrastructure for soliciting, reviewing, and managing scientific research.

The Nutrition Regulatory Science Program marks a joint effort to: Investigate how dietary patterns, additives, and ultra-processed foods drive chronic disease. Understand lifespan health outcomes, including autoimmune conditions, from early-life nutrition. Transform findings into actionable policy and transparent regulation. A push toward "radical transparency" about how food affects long-term health.

https://www.nutritioninsight.com/news/fda-nih-nutrition-regulatory-science-program.html

## "Ready meal crisis": UK health group renews calls for tougher government action on salt reduction after new study

One in five ready meals are "unacceptably high in salt, fat, and saturated fat," warns a new product survey from Action on Salt (AoS).

To mark Salt Awareness Week (May 12-18), AoS urges the UK government to end voluntary salt reformulation and enforce stricter regulations over how much sodium content can be in products.

The new research finds that supermarkets and food companies are selling "worryingly salty" ready meals. This has prompted AoS, based at Queen Mary University of London, to call on the government to do more to improve the nutritional quality of foods.

An open letter, calling for more robust action has been co-signed by 28 leading experts and major health charities, and sent to the minister for Public Health & Prevention, Ashley Dalton MP.

Sonia Pombo, head of impact and research at Action on Salt, tells Food Ingredients First the group is demanding action on four central areas: "Revitalization of the national salt reduction program as a public health priority; immediate review of the outdated 2024 salt reduction targets; setting new, stricter, mandatory salt targets with financial penalties on food businesses for non-compliance; and considering fiscal levers to incentivise reformulation."

AoS analyzed 1,511 ready meals across 11 UK retailers for salt, saturated fat, and fibre content.

Findings: 56% were high in salt, 42% high in saturated fat, 71% low in fibre. Vegan meals had the most favourable nutritional profile: lowest in salt, fat, and saturated fat; highest in fibre. Supermarket own-label meals made up 76% of the total. High salt content was especially prevalent in: Iceland (86% of meals high in salt), Aldi (70%), Lidl (64%), M&S and Sainsbury's (54% each), Morrisons (40%).

AoS, backed by 28 experts and health charities, is calling for decisive action: Revive the national salt reduction program as a public health priority. Review outdated 2024 salt targets. Enforce new mandatory salt targets—with financial penalties for non-compliance. Incentivize reformulation via fiscal levers.

https://www.foodingredientsfirst.com/news/aos-calls-government-action-salt-reduction-ready-meals.html

## Arsenic contamination found in 100% of US rice samples, as campaigners call for tougher action

US research has found arsenic contamination in 100% of rice samples.

Arsenic is associated with serious health risks, including cancer, and harm to the developing brain, including IQ loss. The report shows that arsenic levels have not declined over the past decade despite the US Food and Drug Administration's awareness of the problem.

Nonprofit organization Healthy Babies Bright Futures (HBBF) tests found four toxic heavy metals in rice: arsenic, cadmium, lead, and mercury. The highest levels were detected in brown and white rice grown in the Southeast US or labelled simply as "USA" and in arborio rice from Italy. HBBF also tested 66 samples of nine alternative grains, including quinoa, farro, and barley. On average, these grains contained 69% less heavy metal contamination than rice, making them safer substitutes.

The most contaminated rice types were: Brown and white rice from the Southeast US, Products labelled simply "USA", Arborio rice from Italy. HBBF also tested 66 samples of alternative grains like quinoa, farro, and barley. These showed on average 69% lower heavy metal levels than rice. However, cost remains a barrier — alternatives can be up to 5x more expensive than rice.

Three safer rice types identified: California-grown rice, Thai jasmine & Indian basmati. These averaged 32% lower in heavy metal contamination. Notably, saffron-seasoned rice was flagged for containing lead levels 32 times higher than other samples — possibly due to spice contamination.

The crisis disproportionately affects Hispanic and Asian children, who may have up to 7x greater exposure to arsenic due to higher rice consumption.Pregnant women and babies in these communities are particularly vulnerable, prompting urgent calls for protective policies.
https://www.foodingredientsfirst.com/news/arsenic-contamination-found-in-100-of-us-rice-samples-as-campaigners-call-for-tougher-action.html

## European coalition calls for tougher laws on cancer-linked nitrites in processed meats

A group of leading scientists and politicians has formed a pan-European coalition to combat the use of nitrites in processed meats.

The launch follows years of mounting evidence that the chemicals, which are used as preservatives for colour, flavour, and shelf life, pose a significant cancer risk. In 2015, the World Health Organization (WHO) classified processed meats as a Group One carcinogen — the same classification as tobacco — and attributed 34,000 global cancer deaths a year to diets high in processed meats. Nitrites can form nitrosamines during digestion and high-heat cooking.

The Coalition Against Nitrites, a non-profit organization, has been launched to reduce the cancer rate by calling for tougher legislation on the meat industry. The coalition has the backing of three authors of the 2015 WHO report and other academics and food experts.

Lord James Bethell, a health minister in the last UK government, says removing nitrites from processed meats is "a no-compromise measure" that could reduce pressure on the National Health Service: :"Colorectal cancer is the

fourth most common cancer in the UK, with approximately 44,100 new cases diagnosed every year — the equivalent of 120 cases every day."

Nitrites, commonly used to preserve processed meats and enhance colour and flavour, can form nitrosamines during digestion or high-heat cooking—compounds classified as Group 1 carcinogens by the WHO. Some UK manufacturers have already rolled out nitrite-free meats. The coalition emphasizes reformulation is possible without compromising food safety or consumer appeal.
https://www.foodingredientsfirst.com/news/leading-scientists-nitrite-ban-processed-meats.html

## FDA tightens food chemical review process to enhance supply chain safety

The US Food and Drug Administration (FDA) has unveiled plans to step up the safety reviews of chemicals in foods to enhance the transparency of those already on the market.

The FDA will also take steps to expedite its review of chemicals currently under scrutiny, such as phthalates, propylparaben, and titanium dioxide.The organization conducts post-market reviews case-by-case, often in response to citizen petitions or new scientific evidence. It says the new framework will be "proactive, science-based, and built for long-term impact." The FDA has launched a systematic review strategy for chemicals already approved and present in the food supply. The initiative marks a transition from reactive, case-by-case reviews to a proactive, long-term oversight model aimed at restoring public trust and reducing chronic disease risks.

The agency has prioritized several high-profile compounds: BHT & BHA – Antioxidants used to prevent fat oxidation; ADA (Azodicarbonamide) – A dough conditioner in bakery products & Phthalates, Propylparaben, Titanium Dioxide – Controversial for their endocrine or genotoxic potential and under growing scrutiny from consumer advocates.

Responding to criticism, the FDA is reassessing the self-affirmation process that lets companies label ingredients as "Generally Recognized As Safe" without FDA oversight.Rising consumer demand for ingredient transparency is driving these shifts. The initiative is aligned with earlier moves, such as the phase-out of petroleum-based synthetic dyes and approvals of natural colorants like butterfly pea extract and Galdieria blue.

It signals a tighter grip on legacy chemicals and increased accountability for GRAS determinations.This evolving policy environment could significantly reshape formulation strategies, especially for clean label or plant-forward portfolios.
https://www.foodingredientsfirst.com/news/fda-tightens-food-chemical-review-process-to-enhance-supply-chain-safety.html

## Global clean label market trends

Global consumers embrace clean label products as they increasingly prioritize health, transparency, and sustainability.

With increasing awareness of how ingredients affect personal well-being and the environment, there is a growing preference for products made with simple, natural, and recognizable ingredients. Innova Market Insights' Innova360 research into global clean label market trends highlights the modern demand for trustworthiness and ethical practices. The research sheds light on consumer preferences, innovative product launches, environmental trends, and potential future developments.

Consumers increasingly prefer natural F&B products with reduced ingredients that benefit the body and support healthy eating. Some consumers associate the freshness and the natural attributes of food and beverages with health. This finding reflects the consumer's perception of greater health value in natural foods than processed ones.

Consumers across the globe are demanding simple, natural, and transparent ingredients, driving the clean label movement beyond mere marketing into a key trust-building strategy for F&B manufacturers. 38% of consumers associate freshness and 35% link naturalness with health, favouring unprocessed, additive-free products.

Sugar is most commonly rejected, followed by fat, sodium, preservatives, artificial sweeteners, and synthetic additives. Easy-to-understand ingredient lists and "no artificial additives" claims form the backbone of clean label appeal.

About 30% of global product launches now carry clean label claims.Australasialeads in additive-free claims; North America dominated by GMO-free claims and Europe prioritizes ethical and environmental sourcing. Top categories are Baby/toddler products, Cereals, soups, and meat substitutes & Fastest-growing: Hot drinks and plant-based meats

Over 50% of consumers base purchase decisions on front-of-pack health claims.Most influential claims are: Natural, locally sourced, organic, environmentally responsible& traceable origin. One in 3 consumers seeks new ingredients like: Botanicals, Seeds & grains; Natural sweeteners (stevia, allulose, date syrup). Rising use of cocoa nibs, fibre-rich grains, and "whole food" ingredients like bran bread to deliver nutritional function.68% of consumers link botanical flavours with sustainability and are willing to pay more for eco-aligned options.

Emerging Concepts: 1. "Minimally processed" over ultra-processed, with clearer definitions, 2. Artisan and handmade positioning surging with 8% and 5% CAGR & 3.Short ingredient lists emphasizing provenance and purpose.
https://www.foodingredientsfirst.com/news/global-clean-label-trends-consumer-preferences-2025.html

## India triggers boycott of Turkish-origin FMCG goods

The All India Consumer Products Distributors Federation (AICPDF) has announced an indefinite boycott of all Turkish-origin FMCG goods across the country, which is expected to have knock-on effects on the F&B industry.

It is understood that the AICPDF has urged distributors and India's thousands of Kirana stores — small convenience stores selling groceries — to stop selling and distributing any Turkish FMCG products immediately.
The directive is a protest against Türkiye's support for Pakistan during its recent military conflict with India. Turkish President Recep Tayyip Erdogan has previously expressed public solidarity with Pakistan.

All Turkish-origin FMCG products, including indirect imports, are being removed from supply chains, warehouses, retail counters, and digital platforms across India. Thousands of Kirana stores (small family-run convenience outlets) are instructed to stop selling Turkish products immediately.Targeted Sectors: Food & Beverage: Premium chocolates, Turkish delight, golden truffles, jams, coffees; Non-Food FMCG: Personal care and fashion products.
https://www.foodingredientsfirst.com/news/india-boycott-turkish-fmcg-over-pakistan-conflict.html

## Thailand to amend nutrition labelling guidelines for 'better visibility and industry compliance'

The Thai government has announced further plans to amend nutrition labelling guidelines after industry complaints around implementation.

Thailand has been making various amendments to the labelling regulations for food and beverage products, including stricter criteria for on-pack health claims, laying the onus on manufacturers for the inclusion of clear information on labels and recently revising the Healthy Choice logo eligibility criteria for several products.

According to the local Thai Food and Drug Administration (Thai FDA), feedback from the industry has indicated that these changes have not solved some core, practical labelling issues, thus another round of public opinion is being sought on new changes to labelling criteria.

Thailand has been tightening food labelling laws: stricter health claims, refined "Healthy Choice" logo criteria, and GDA (Guideline Daily Amount) format mandates.Industry feedback revealed issues with colour contrast, printing on unconventional packaging, and term flexibility (e.g. "Sugar" vs. "Total Sugar").

## Key Revisions to GDA Labelling

| Aspect | Old Rule | Amended Rule |
|---|---|---|
| Box Colour | Only black, dark blue, white | Any colour, as long as font and background contrast is clear |
| Background Colour | Mandatory white, even on corrugated containers | Exceptions allowed for impractical packaging; legibility takes priority |
| Nutrient Text | Fixed terms like "Sugar", "Fat" | Flexibility to use "Total Sugar", "Total Fat" to align with NIP language |

Implications for Industry and Policy Modelling: Improved Compliance:
These changes address both design practicality and printing feasibility, especially on secondary packaging.
Global Alignment: Eases trade barriers by reflecting more flexible international norms, important for ASEAN-wide food exports.

Consumer Communication: Allows clearer alignment between GDA labels and Nutritional Information Panels (NIP), enhancing transparency.

https://www.foodnavigator-asia.com/Article/2025/04/02/thailand-to-amend-nutrition-labelling-guidelines-for-better-visibility-and-industry-compliance/

## UPF 'risk scale' launched by Zoe to tackle 'scaremongering'

A milestone in the UPF metrics debate as health app Zoe poses solution to "scaremongering" Quietly, the trailblazing health app Zoe has worked on and launched its own UPF scale to help stamp out consumer "scaremongering".

The new scale flies in the face of the existing Nova classification system and scuppers a variation on the tool currently being researched by big pharma owner the Novo Nordisk Foundation. Presented in the UK House of Lords this month, Zoe's new Food Risk Scale poses "not all UPFs are equally detrimental to health" and splits processed foods four categories. The four Zoe UPF risk categories are: no risk, low risk, moderate risk and high risk. Like the variation on the Nova system, under research by professor Susanne Bügel at the University of Copenhagen for GLP-1 drug maker Novo Nordisk, Zoe's system classifies foods based on energy intake and the combination of 'natural' and 'manmade', "hyper-palatability" ingredients.

The Problem with Nova: The Nova classification lumps foods into four broad categories based on processing level, with UPFs seen as the most harmful. Critics argue that Nova lacks nuance: it treats all UPFs—irrespective of nutrient content, functionality, or cultural relevance—as harmful. Zoe's scale attempts a more layered approach, recognizing gradations of risk based on energy density and presence of hyperpalatable, engineered ingredients.

This classification leans into the degree of engineering, not just the processing per se—echoing some of the latest food matrix and satiety studies.

Implications for Consumers and Policymakers: Empowerment vs Confusion: Consumers may appreciate the nuance, especially if paired with app-based tools (e.g. barcode/photo analysis). But deviation from government guidance could cause conflict. Scientific Challenges: The link between processing and health is still being debated in academia. Evidence is associational, not necessarily causal. Food Industry Pushback: Predictably, trade bodies like the FDF see this as disruptive, fearing regulatory or reputational fallout.

https://www.nutraingredients.com/Article/2025/03/31/zoe-food-app-launches-upf-health-scale-to-calm-consumers/

## "Why additive bans are forcing a faster pivot to transparency"

PFNDAI Jul 2025

Deniz Ataman explores how evolving food additive regulations are accelerating the food and beverage industry's shift toward greater transparency and data-driven compliance.

Regulatory Pressure: Recent bans—like the FDA's

deauthorization of Red Dye No. 3 and California's prohibition of brominated vegetable oil (BVO) and potassium bromate—are reshaping the compliance landscape.

Consumer Demand: Today's consumers, especially Gen Z and Gen Alpha, expect not just "clean" labels but clear justifications for every ingredient—what it is, why it's used, and where it comes from.

The clean label movement has evolved from passive exclusion (removing controversial ingredients) to active justification (explaining ingredient purpose and origin). This is prompting innovations like smart labels—QR codes that reveal allergen info, sourcing details, and sustainability scores.

Platforms like Syndigoare helping brands manage complex product data using AI to:Simulate reformulations; Flag regulatory risks; Ensure label accuracy. For example, AI can detect mismatches like a product claiming to be "rich in calcium" without supporting ingredients.There's no universal substitute for banned additives. Potassium bromate, used for dough texture, lacks a clear alternative.Large brands have adapted quickly, but smaller players are still catching up.

https://www.foodnavigator-usa.com/Article/2025/04/14/ai-drives-faster-compliance-for-cpg-companies/

# Thailand amends standards for fruit-based spreads to align with international requirements

Thailand has set new standards for jam, jelly and marmalade fruit-based spreads to align manufacturing with international standards.

Previously, the definition for fruit-based spreads was broadly similar across categories, resulting in products with different fruit content all being described as the same. The amended standards now mandate manufacturers to hit specific amounts of fruit content, before being allowed to label their items as jams, jellies or marmalades.

"The Ministry of Public Health has determined that it is necessary to amend the previous standards for jams, jellies and marmalades sold in sealed containers in Thailand, in order to be aligned with international standards," Thailand Minister of Public Health Somsak Thepsuthin said via a formal statement.

The Thai Ministry of Public Health has revised standards for jams, jellies, and marmalades to: Align with international norms; Prevent consumer misinformation; Standardize fruit content thresholds across single- and multi-fruit products.

Lower thresholds allowed for certain fruits due to natural pulp yields: 25%: e.g. mango, quince, rambutan; 20%: soursop, cranberry; 15%: banana, guava; 10%: durian &5%: tamarind, passion fruit, acidic fruits

Labelling Requirements: Product name (jam, jelly, marmalade) must be clearly stated. For multi-fruit items, list fruits in descending order by content weight. Designed to enhance transparency and consumer clarity.

Regulations are already in effect. 18-month grace period until August 2026 for compliance (label reformulation and content adjustment).

This move reflects Thailand's intent to: Align with Codex standards and international trade expectations.

| Product Type | Fruit Content by Weight | Notes |
|---|---|---|
| Single-fruit jam/ jelly | ≥35% | Standard threshold |
| Mixed-fruit jam/ jelly (2 fruits) | Main fruit ≥50% of total fruit content | If equal parts, label based on higher pulp content |
| Mixed (3 fruits) | Main fruit ≥33.33% | |
| Mixed (4 fruits) | Main fruit ≥25% | |
| High-pulp claim | ≥45% | Applies only if above thresholds are already met |

## Marmalade-Specific Standards

| Marmalade Type | Fruit Content by Weight | Notes |
|---|---|---|
| Citrus marmalade | ≥20% total; 7.5% endocarp | Focuses on fruit pulp specifics |
| Non-citrus marmalade | ≥30% | Ginger marmalade: ≥33% |
| Marmalade jellies | ≥20% juice content | Only permitted flavourings: fruit-type, mint, cinnamon, vanilla |

Encourage accurate marketing practices and product integrity. Support consumer literacy around fruit content and quality cues.

https://www.foodnavigator-asia.com/Article/2025/04/14/thailand-amends-standards-for-fruit-based-spreads-to-align-with-international-requirements/


# Europe's Nutri-score war rumbles on as retailers back the scheme

Despite the European Commission's recent move to distance itself from a mandatory rollout of Nutri-score, supermarkets continue to press ahead Nutri-score's future is on a knife edge following a European Commission (EC) climbdown to roll it out as a mandatory scheme across Member States

last month.

But food and drink makers have since been left in labelling limbo. While there was no commitment on a rollout, the EC also failed to clarify what the future of the voluntary scheme was and whether it could be scrapped altogether.

An EC spokesperson reiterated previous comments on the organisation's commitment to working with Member States and providing consumers EU-wide with safe and transparent information, when asked for an update on its Nutri-score position today (March 15). Such a move could be problematic for retailers and some manufacturers that have invested in Nutri-score, creating a Wild West of sorts when it comes to front-of-pack labelling rules and expectations.

### Nutri-score at a Glance:

Purpose: A color-coded front-of-pack label (A to E) intended to guide consumers toward healthier choices. Voluntary Scheme: Though used widely, the European Commission (EC) withdrew plans for a mandatory rollout.

### Emerging Flashpoints

Fragmented Implementation: Lack of EU-wide standard creates a regulatory headache for manufacturers navigating different retailer and country expectations.

Algorithm Update in France: Stricter scoring from 2025; voluntary but incentivized. Risk to Artisanal Heritage: French government probing cultural impacts on traditional foods.

https://www.foodnavigator.com/Article/2025/04/15/food-manufacturers-and-retailers-at-nutri-score-loggerheads/

## Tug-of-War: Support vs. Opposition

| Supporters Arguments | Critics Concerns |
|---|---|
| Helps reformulate products to reduce sugar, salt, additives; improves overall diet quality | Penalizes energy-dense, natural foods like juices or cheeses; lacks cultural nuance |
| Mandated Nutri-score for suppliers; tied to promotional visibility | "Flawed" scoring of calories and fat; higher water = better score |
| Ambiguous stance — supporting transparency but no policy update | Consumer confusion, high implementation cost |

# Clean label claims: Rising litigation trends zero in on claims about 'real fruit,' natural flavours, heavy metals, PFAs and more

Class action lawsuits filed against food and beverage companies surged last year – reversing a multi-year downward trend but still falling significantly short of the 10-plus year high in 2021, according to analysis by the law firm Perkins Coie presented at an event hosted by Prime Label Consultants

Last year, 256 class action lawsuits were filed against food and beverage companies – up 58% from the 187 cases filed in 2023 and the most filings in one year since Perkins Coie began tracking the data in 2008. But, the number of cases filed was still down 8.9% from the high of 325 filed in 2021, which was the peak of a five-year steady climb, lawyers with Perkins Coie note.

2024 saw a 58% increase in food and beverage-related class action lawsuits (256 total) compared to 2023. While still below the 2021 peak (325 cases), the trend signals renewed legal scrutiny, largely fuelled by: a. The Make America Healthy Again (MAHA) initiative, b. A patchwork of state-level additive bans, c. FDA's increased post-market surveillance of food chemicals.

Claims About "Real" or "Natural" Ingredients: "Made with real fruit" or "naturally flavoured" claims are challenged when synthetic or flavour-enhancing ingredients (e.g., malic acid) are present. Example: Walmart, Target, and KLN Enterprises face lawsuits for such claims in fruit bars and liquorice.

Predominant Ingredient Misrepresentation: Lawsuits argue that "real cheese" or "all butter" claims are misleading when: Cheese isn't the main ingredient. Products contain fillers (e.g., whey, palm oil, shortening).

Contaminant-Based Allegations: Heavy metals, PFAs, microplastics, and phthalates are increasingly central to clean label litigation. Triggered by media exposés (e.g., Consumer Reports), such cases affect: Baby food (e.g., Plum Organics) & Chocolate, kombucha, and beverages. Courts are split: Some dismiss cases for lack of demonstrated risk, others allow them to proceed.

In 2025, the FDA issued final guidance on lead limits in infant food — part of a broader effort to reduce food contaminants while maintaining access to nutrient-rich products. New State laws are banning or restricting specific additives, leading to: Inconsistent regulatory environments & Increased company vulnerability to litigation.

The potential changes to self-determination of GRAS (Generally Recognized As Safe), likely increasing pressure on brands to demonstrate safety more transparently. For every lawsuit filed, an estimated 5–10 demand letters go out quietly — signalling broader challenges outside the courtroom.

The "ultra-processed" foods debate is transitioning from a nutrition and media focus to a legal and regulatory battleground. This could have sweeping effects on everything from product labelling to formulation and marketing — especially in light of shifting consumer preferences and political interest.

https://www.foodnavigator-usa.com/Article/2025/04/15/clean-label-claims-in-the-crosshairs-rising-litigation-trends-zero-in-on-claims-about-real-fruit-natural-flavors-heavy-metals-pfas-and-more/