



# FOOD, NUTRITION & SAFETY MAGAZINE

PFNDAI

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# FOOD PROCESSING AND ITS CONTRIBUTION IN PROVIDING FOOD SAFETY AND NUTRITION

Ms Meenu Yadav

**TRADITIONAL  
INDIAN FOODS AND SWEETS**

Dr Shashank Bhalkar

**RISK ASSESSMENT:  
THE SCIENCE OF  
KEEPING CONSUMERS SAFE**

Dr JI Lewis

**TECHNOLOGY FOR  
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**HYDROCOLLOIDS  
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**UNLOCKING THE  
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# INDEX



## COVER STORY 1

JRS India,  
IFF,  
Food Ingredient Specialities,  
Bee Pharmo Labs,  
Vasta Biotech,  
Marico,  
Fine Organic Industries Ltd,  
Mondelez,  
Roha Dyechem Pvt Ltd,  
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Editorial

Scientific Perspective By Dr Sesikeran

Regulatory Viewpoint By Dr Lewis

FOOD PROCESSING and its Contribution in ..... 1  
providing Food Safety and Nutrition  
By Ms Meenu Yadav

Traditional Indian Foods and Sweets ..... 9  
By Dr Shashank Bhalkar

Risk Assessment: The Science of Keeping ..... 16  
Consumers Safe  
By Dr JI Lewis

Technology for Fancy and Healthy Biscuits ..... 21  
for Everyone:  
By Dr Jagadish Pai

Hydrocolloids and the Sticky Secrets behind ..... 26  
your Favourite Foods  
By Ms. Sanyukta Telange

Unlocking Nutrient Potential: Understanding ..... 33  
Antinutritional Factors in Foods and Effective  
Reduction Strategies.  
By Ms Simran Vichare

Conference on Today's Foods: Convenience, Safety and .. 39  
Health: Session 2: Efficacy & Safety of Adjuncts to Food  
By Ms Sanyukta Telange

Regulatory Round Up ..... 43  
By Dr Shashank Bhalkar

Research in Health & Nutrition ..... 45  
Food Science and Industry News ..... 55

Regulatory News ..... 63

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# MILLETS, THE NUTRI-CEREALS ARE COMING BACK:

Milletts were our main cereal many decades ago. Our forefathers ate millets such as jowar and bajra and ragi, but the green revolution changed that. There was a definite need for the green revolution to stave off a certain famine and we survived because of high yielding varieties of wheat and rice. These grains became easily available and affordable and people got easily used to them as they were easier on tongue.

Slowly people got away from millets and ate more of wheat and rice, which were also more profitable for farmers who produced these more over millets. Although they needed more agricultural inputs compared to millets, wheat and rice had ready markets and farmers earned more as their yields were much more than millets. Millets then became a poorer choice for farmers and they relegated them to poorer soil. Millets are hardy and can grow in poor conditions of soil, water and agricultural care. And somehow, they survived and by middle of 2010s people thought that it would vanish.

Humans were just taking away from the good earth whatever they could of its natural resources without replenishing them and not bothering about the changes in the environment for over a century till there were warning signs of disaster impending unless some drastic changes were made in our entire lifestyle. The population was steadily growing and usage of resources for food, habitat and luxurious lifestyle was so skewed that scientists realised that global warming would not enable the same to continue for long unless drastic changes were made.

One such hope was shown to be humble millets that were almost disappearing. After realising that millets could survive the environmental changes, as it could grow under poorer soil,

less water, unfavourable environment and would outlast any other crop in this battle against unfavourable nature.

As India is the largest producer of millets, with about 20% of global production, we had to set the pace of change to bring back millets to our plate. Central Government decided to call them Nutri-Cereals in Gazette notification in 2018. India also sponsored a resolution in the United Nations General Assembly and got it to declare 2023 as the International Year of Millets.

Soon after declaring them as Nutri Cereals, there were efforts in order to bring them back to our plates. Researchers developed newer biofortified and higher yielding varieties. There were efforts by help groups to develop nutritious meals from millets. Creating awareness about their health benefits was another very important process started by various organisations and health professionals. Millets were made available in PDS and support prices were given. Guidelines are being prepared by FSSAI to include millets in food menus of schools, hospitals and government canteens. Food industry started developing and marketing millet products. Consumers have started including millets in their diets. Farmers have also decided to grow more millets. Thus, the efforts from all stake-holders are finally being seen. Dr Jacqueline Hughes, Director General of ICRISAT has said in a recent blog that "Millets: The Nutritional Powerhouses Making a Comeback in 2023"; both on plates and farms in recent years.

This is an excellent sign of return, but we cannot remain complacent and must continue all the efforts to make total comeback of these Nutri Cereals.

**Prof Jagadish Pai,**  
Editor, PFNDAI

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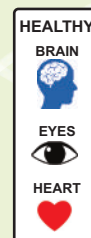
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# LET US MILLET!



**Dr K Bhaskarachary**  
(former Dy. Director,  
ICMR NIN)

**Dr Sesikeran. B, MD**  
Former Director, National  
Institute of Nutrition (ICMR)  
Hon. Scientific Director, PFNDAI

Millets are good for the planet, good for the farmer and good for you too.

Global production of millets is around 31 million tons, led by India with 38% of the world's total production. India is among the top 5 exporters of millets in the world. Millets are not a single type of grain but a group of many varieties cultivated in different parts of the world.

With advancement of scientific knowledge, millets which were known from prehistoric times as **coarse cereals** have been redesignated as **nutricereals**. Since water

scarcity has become a significant global concern, shifting to crops like millets could help save water resources and reduce the strain on freshwater systems (**Water conservation**). Millets are astonishingly low water consuming crops. The water needed for Sorghum, Pearl Millet and Finger Millet is less than 25% of water needed to cultivate sugarcane and banana, and 30% less when compared with rice. We use 4000-5000 liters of water to grow one kg of rice, however, only 200-300 liters of water is required to produce 1 kg of millets. Millet is more resilient to extreme weather conditions, such as drought and heat, making it

a more sustainable option in the face of climate change and in addition they are resistant to pests and diseases. They take a shorter time to grow, and better productivity under drought conditions, compared to major cereals (**Climate resilience**). Promoting the cultivation of millets helps maintain biodiversity by supporting a wider range of crops, rather than relying heavily on a few major staples like rice and wheat (**Biodiversity preservation**). Millets require fewer pesticides and fertilizers, promoting environmentally friendly and sustainable farming practices. By switching to millet production, communities can enhance their resilience to environmental challenges while contributing to sustainable agriculture and food security (**Sustainable agriculture**). Diversifying diets with millets can contribute to better nutrition and food security (**Nutritional benefits**).

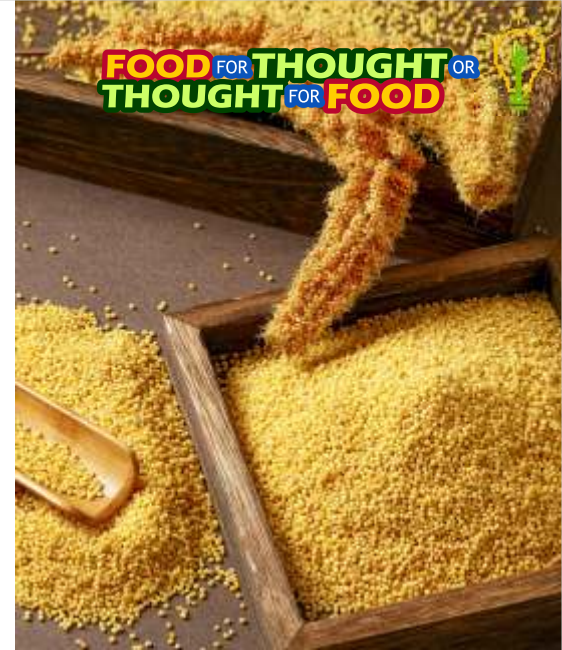




Millets are nutritionally superior to wheat and rice as they are rich in protein, vitamins, dietary fiber and minerals. They are also gluten-free (useful in gluten intolerance or celiac disease) and have a low (Proso millet) to medium (Jowar, foxtail millet, Bajra, Barnyard, Little millet) glycemic index (49-69 GI except Ragi .GI>70), making them ideal for people with overweight or diabetes. Unlike wheat and rice, millets are generally consumed in their whole form making the intestinal transit time longer therefore delaying stomach emptying, improving satiety, which leads to slower release of glucose and benefits in weight and diabetes management. Finger Millet (Ragi) is the richest source (364mg/100g) for calcium. Calcium is an essential element for bone strength.

Traditionally south Indians used to consume Ragi Ambali (Gruel) which is a great source of many other nutrients in addition to calcium. Millets are also very rich sources for magnesium (more than 100 mg/100 g) which has a vital role in the blood pressure management. Foxtail millet is not only rich in magnesium that helps regulate blood pressure but also rich in iron and calcium that help boost immunity levels. Barnyard millet (Sanwa) possesses other functional constituents i.e., Gamma Amino Butyric Acid (GABA) with neuropsychiatric benefits and Beta - glucan, which helps in reducing blood lipid levels. The millet protein characterization showed that its protein concentrate is a potential functional food ingredient and the essential amino acid pattern suggests possible use as a supplementary protein source to most cereals because it is rich in lysine. In India, various alcoholic beverages are produced from millets.

In India, eight millets species {Sorghum (Jowar), Pearl millet (Bajra), Finger



millet (Ragi), Foxtail millet (Kangni), Kodo millet (Kodara), Proso millet (Barre), Barnyard millet (Sanwa) and Little millet (Kutki)} are commonly cultivated under rain fed conditions in addition to many other varieties of millets. Thus, replacing 1/3 of wheat or rice with millets (Usually one consumes average 240 grams of cereal daily as a part of balanced diet) will not only benefit humans but also farmers and our planet.

(Reference: Dayakar Rao B., Bhaskarachary K., Arlene Christina G.D., Sudha Devi G., Vilas, A. Tonapi, 2017, Nutritional and Health benefits of Millets. ICAR\_IndianInstituteofMillet sResearch(IIMR) Rajendranagar, Hyderabad)



# FOOD SAFETY IS A CULTURAL PRACTICE.



AUTHOR

**Dr Joseph I Lewis,**  
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PFNDAI

In 2021, it was estimated that India had 302.4 million households with an average size of 4.4 individuals. Cooking twice a day represents 2.4 billion meals consumed. Without formal training in good manufacturing and hygiene practices, these meals are safe to eat. The confidence is so complete that any complaint of an upset tummy is always attributed to outside food. While home cooking supplies a household, commercial establishments supply a population. The food risk is high as it affects many. So, what makes home-cooked food so trustworthy, when there are no inspections, audits, or enforcement?

Switch to another scenario. About 3 million registered and 8 lakh licensed food businesses prepare and sell foods, packaged or served on-site. Businesses account for about 1% of all units preparing foods: yet they must follow systems and practices; GMP, GHP, HACCP, and FSMS, to ensure safe foods. They put in place four layers of safe practice. First, through inspections and testing unsafe

levels of chemicals such as contaminants, pesticides, toxins, and biological and physical hazards are restricted from entering the supply chain. In the second stage, they ensure that only safe food is placed on the market through food safety management systems. The third stage is a recall system to remove unsafe foods from stores and homes. The fourth step - not often talked about - is traceability which identifies the failure point in the supply chain, so that it is not repeated.

Food manufacturing has many practices. Installed by the company these are inspected, audited, and certified. Businesses do well in inspections, audits, and certification. Consumers feel confident when company product labels display certification logos from external agencies. A compliance system may lead to complacency until something goes wrong. When it does only the QA team is functionally responsible for checking the system once again. The question arises why didn't the several agencies find anything missing before the failure? Food safety is not a conformance to standard practice. It involves identifying, assessing, and minimizing hazards that compromise the

safety of products made and sold. It is a behavioural practice.

In both cases, the home or factory, systems operate to keep consumers safe. Except in home cooking, it is so deeply embedded that it's unnoticeable. At home, everything revolves around a single word "hygiene", as applied to person, place, food, and utensils. The "why" of doing things is handed down through generations and food safety becomes encultured in a mindset. It is invisible because it is normal behaviour. Being medically fit is no different from sanitised equipment. A processing facility free of pests and dirt is no different from washed hands. The hygiene mindset covers everyone and everything. Like the home kitchen, businesses too must install the dominant culture or a single mindset for the rest to follow.

Culture is looking for what can go wrong before it does. The household chain represents a single culture, compared to the many in a commercial supply chain. Every product in the marketplace represents the cumulative safety practice by each FBO in the supply chain. From home to business to the supply chain, making food trustworthy requires a cultural practice.

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# FOOD PROCESSING

## AND ITS CONTRIBUTION

### IN PROVIDING

# FOOD SAFETY

## AND NUTRITION



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Food and nutrition security, a major global challenge, relies on the adequate supply of safe, affordable, and nutritious fresh and processed foods to all people. The challenge of supplying healthy diets to 10 billion people in 2050 will be met through increase in food production. However, reducing food losses throughout the supply chain from production to consumption and sustainable enhancements

in preservation, nutrient content, safety, and shelf life of foods, enabled by food processing will also be essential.

Food processing is the alteration of foods from the state in which they are harvested or raised to better preserve them and feed consumers. As the 2007 World Food Prize Laureate Philip E Nelson said, "If you teach a person how to process food, you can feed a village" (P Nelson, personal communication, 2013). Processed food contributes to both food security (ensuring that sufficient food is available) and nutrition security

(ensuring that food quality meets human nutrient needs).

Processing began in prehistoric times. As agriculture and animal husbandry spread, it was essential to preserve foods to avoid losses because of spoilage and to survive during times of scarcity. Food processing was probably the first "technology" that was sufficiently successful such that it led to a segregation of societies into discrete artisan industries. As such, food processing as an industry was likely the steppingstone to urbanization.



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1.5 Million years ago, diets primarily were unprocessed plant-based foods but with time both home and commercial processing soared. Now in 21st century we have increased reliance on commercially processed food supply and globalization. More women entered work force shifted economy and demand for convenient readily available foods (Weaver et al, 2014)

Until recently, much preservation and processing of food were done at home; only within the past 100 y has large-scale food processing become an industrial process. The basic steps involved in preservation and processing and their consequences on food quality, nourishment, and safety are largely the same, however, regardless of whether food is processed at home or commercially (Weaver et al, 2014).

Processed foods contribute to the health of populations: Food security is increasingly challenged by land, water, and energy scarcity. The 2012 Global

Hunger Index report claimed that “the progress in reducing the proportion of hungry people in the world has been

tragically slow”. The report concluded that more food needs to be produced with fewer resources and that wasteful practices and policies should be eliminated. With >1 billion people worldwide considered to be food insecure, the need to use technology to efficiently produce an abundance of safe and affordable food was not disputed by 95% of survey respondents in the International Consumer Attitudes Study (Simmons Et Al 2010).

### Factors that affect Food Supply Chain in future are:

1. Population growth
2. Food insecurity
3. Globalization of the food supply
4. Food-borne illness
5. Aging population and increased noncommunicable chronic degenerative diseases
6. Economic factors including recession and

inflation

7. Women in the workforce and time constraints
8. Consumer demands
9. Competition

Nutrition scientists, public health professionals, agricultural economists, food scientists, and other professionals dedicated to meeting the food and nutritional needs of people around the globe recognize that fresh, local foods cannot meet all nutritional requirements. Food processing is necessary (Floros et al, 2010). National and global goals for nutrition and health can only be accomplished by incorporating attention to food processing into social and economic reforms.

### Emerging Technologies and Future roles of Processed Foods

Food processing technologies hold substantial promise to promote the health and wellness of consumers. Some of the examples of current and future food processing technology innovations and their benefits to consumers are stated below:

1. Reduce calorie intake by
  - a. Digestion-resistant starches by changing starch structures in plants and modifying starch chemistry.

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- 2. Enhance gut health
  - a. Novel types of fiber such as water-soluble
  - b. Development of prebiotics and probiotics and effective bio delivery systems

- 3. Reduce salt intake
  - a. Altered salt crystal structures such as micro crystallization
  - b. Flavor enhancement approaches to replace salt

- 4. Enhance health benefits of foods
  - a. Stabilized omega-3 fatty acids and DHA enrichment of foods
  - b. Targeted bio delivery with the use of nanotechnology of antioxidants and other bioactive compounds
  - c. Natural colors and flavors derived from plants

- 5. Improve food safety and reduce food waste
  - a. Smart packaging materials
  - b. Temperature and oxygen sensors
  - c. Natural antimicrobials
  - d. Edible packaging

- 6. Reduce allergy
  - a. Nanotechnology approaches to block antigenic agents
  - b. Plant modifications to reduce antigen exposure
  - c. Gluten and Lactose free foods

- 7. Promote fresh but stable foods
  - a. Nonthermal processing: high-pressure processing, ionizing radiation, pulsed electric field
  - b. Advanced packaging techniques
  - c. Improved plant varieties

- 8. Produce age-specific product
  - a. Optimize nutrients for Infants, Children, Pregnancy, Athletes, Midlife, other adults

### Consumer benefits due to these emerging food processing techniques

- 1. Overconsumption of calorie-dense foods is one contributor to obesity, typically combined with inadequate physical activity. Food scientists are exploring ways to address this imbalance by, for example, reducing calorie intake while retaining pleasurable food experiences, slowing digestion while enhancing nutrient bioavailability, improving the palatability and acceptability of high-nutrient-dense foods, and enhancing satiety. The main sources of calories in foods are carbohydrates and

lipids. Modified starches that resist digestive activity (4,5) are being developed. Percentage Calorie reduction techniques will help in reducing risk of obesity, diabetes, and related morbidities while maintaining diverse and enjoyable diet.

2. A major growing consumer interest is in gut health. Characterizing the microbiome of the human gut is currently underway, and this information combined with food technology approaches could affect many aspects of health, including intestinal illness, inflammation, allergic responses, and cancer (6)

3. Alternate Salt crystals help in providing flavour and food quality while reducing excessive salt intake.

4. Omega 3 and DHA enrichment helps in improving dietary quality with enhanced nutrients and bioactive compounds that enhance health well-being and prevent disease.





5. The field of nanoscience is providing scientists the means to explore foods and their safety at a level of detail not previously possible. Nanotechnology tools are being developed to improve food packaging to resist penetration by oxygen and light, increase strength and durability, inactivate pathogens, and improve tracking of products. This technology has the potential to provide sensors and detection devices on packages that confirm freshness or alert the consumer to spoilage. Smart packaging and sustainable packaging solutions provides better information about food handling and safety; ensure food safety; reduces handling to avoid contamination and reduced landfill waste.

6. Another health concern is the increasing incidence of allergic reactions to food components. Nanotechnology approaches are being developed that will block antigens in foods so that reactions are prevented (7). Food technologists are also working with plant genetics to remove allergens directly from plants. Another approach to dealing with the increasing problem of auto immunities in general is to create ingredients and food products that replace allergy inducing ones, such as gluten and dairy for the subset of the population



unable to consume traditional products including bread and milk. Prevention of allergic responses to foods to enhance quality of life. Increased Choices for patients with celiac disease and other form of allergies.

7. Consumers are interested in fresh and less processed foods while also desiring convenient, low-cost, safe, and shelf-stable products. Processing promotes fresh but at the same time stable foods. Advances packaging techniques provides access to fresh, high-quality foods year-round at affordable prices to promote consumption and improve nutrition

8. Age Specific products helps in improving growth and development, enhance mental acuity, prevent, or treat disease, improve fitness and well-being, and prolong quality of life.

9. Address micronutrients or micronutrient malnutrition, also known as hidden hunger, is a serious health risk for the country. One of the strategies to address

this problem is fortification of food. This method complements other ways to improve nutrition such as diversification of diet and supplementation of food.

10. Food processing techniques like food irradiation reduce micro-organisms to the point of sterility. These foods are highly useful for astronauts and for severely immune compromised patients.

Processed Foods and their benefits on health and Safety are well established. Our complex food system can change over time but advances in food processing, science and technology will continue to provide a safe, nutritious, and abundant food supply to meet current and future needs. In this assessment of the nutritional and food safety impacts of processed foods, we conclude that processed foods are nutritionally very important. They contribute to both food security (ensuring that sufficient food is available) and nutrition security (ensuring that food quality meets human nutrient needs).



Nutrition and food science professionals, the food industry, and other stakeholders can help to improve the diets of Americans by providing a nutritious food supply that is safe, enjoyable, affordable, and sustainable; by communicating effectively and accurately with each other; and by working together to improve the overall knowledge of consumers.

Collaborative efforts between food science, nutrition science and behavioral economics are needed to make positive differences in our food supply and the overall health of Indian consumers. We all need to work together to improve the health of current and future generations.

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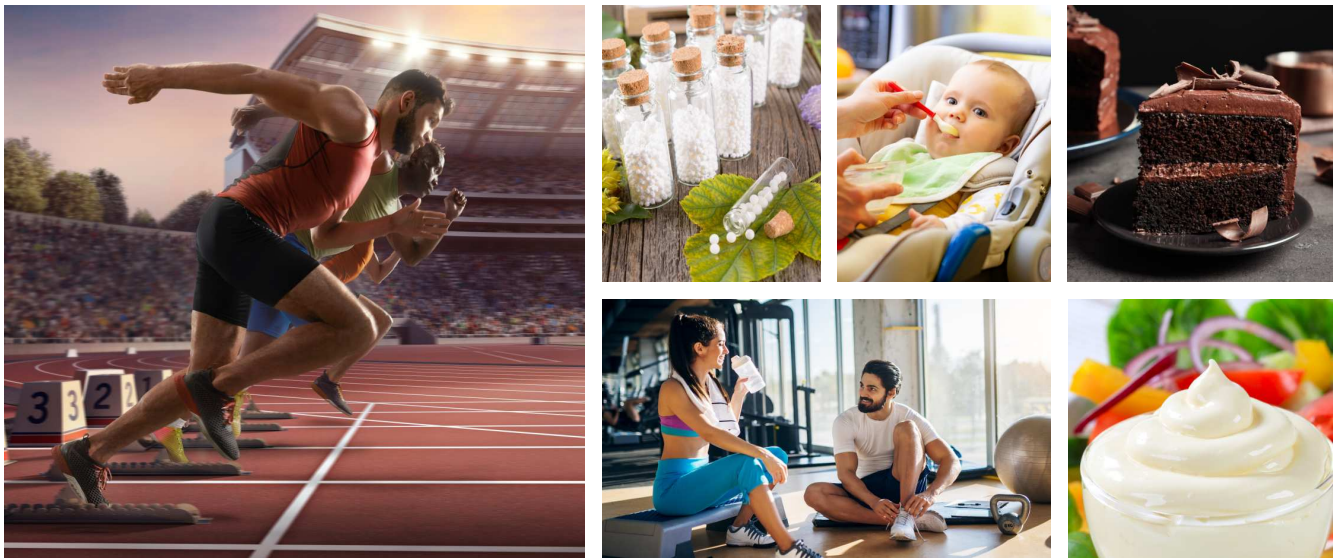
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# A WORLD OF NUTRITION & WELLNESS

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# TRADITIONAL INDIAN FOODS AND SWEETS



AUTHOR

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The traditional Indian diet is rich in dietary fibre from (whole grains, millets, lentils, and vegetables), antioxidants, bioactive molecules from (fruit, vegetables, and spices), and probiotics from (curd, and fermented batter products)(1). They are found to be imparting a lot of health benefits beyond providing adequate nutrition.

Even methods of cooking and pretreatments help to improve nutritional value or reduce antinutritional factors. Indian traditional foods have evolved based on locally available raw

ingredients and have a history that dates from Aryan civilization (3000 BC) to Harappan (2000 BC), and to Vedic (1500 BC). The diet is evolved and influenced by so many religions at various times such as pre-Buddhist Hinduism, Buddhism, Jainism, and post-Buddhist Hinduism. The Islamic empire and its rule for four centuries and British rule also influenced dietary habits in India.

The dietary and culinary habits are different depending upon the geographical location. Locally available food grains and vegetables that nutritionally complement and supplement each other formed the diets. These diets gave better health protection, digestive health, and support to resist health disorders resulting in increased longevity.

India is fortunate to have a variety of local ingredients produced in different regions because of so much variation in the climate that affects the food habits in different places(2). North Indian meals will have unleavened wheat bread called roti or paratha with soups, fried vegetables, chutney, curries, pickles, and curd. South Indian food is generally non-greasy and consists of cooked rice with sambar (tur or arhar broth), rasam, dried and curried vegetables, curd preparations, pickles, and papads. Coastal regions will have a predominance of fish and coconut in the diet.





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Serving Suggestions



Methods of cooking Indian foods and snacks also play a significant role in improving the nutritional values of the foods. Many foods and snacks use a combination of cereals and pulses. Typical examples are khichadi, dhokla, dosa, idli, dal baati, and thalipeeth, which have the advantage of complementary proteins providing all essential amino acids. Fermentation in products like idli, dosa, curd, adai, khaman, amboli, etc. produces enzymes that help digestion. It generates Vitamin B2, beta-glucosidase, and probiotics that help gut health and improve immunity.

Fermentation of pulses helps reduce antinutritional factors such as phytates. In the case of products like curd or dahi, the fermentation of milk generates lactic acid and probiotic bacteria. Cooking and cooling of starchy foods like rice, and potatoes results in the retrogradation of starch, making resistant starches that have low Glycemic Index. Soaking of pulses and cereals improves digestibility and reduces

anti-nutritional factors. Steaming is one of the best cooking practices that preserve nutrients like phytochemicals and water-soluble vitamins. Soaking of cereals and pulses reduces cooking time, reducing antinutritional factors.



Sand roasting has been another popular method of processing. Traditionally many sand-roasted products such as puffed and flaked rice, maize, roasted cereals, and millet are quite popular. This simple and inexpensive method like sand roasting has a variety of advantages. It improves sensory properties like aroma, flavour, and crispiness. It also enhances carbohydrate, protein digestibility, beta-glucan extractability; levels of prebiotic dietary fibre, minerals, and

antioxidants. Inherent anti-nutrients are reduced. There is the reduction of seed microflora making it safe and with increased shelf life.

Traditionally, pickling is done for fruits, vegetables, fish, and meat. This is one of the oldest methods of preservation which makes unique and desirable changes in flavour, and texture. It also improves the probiotic potential. Sprouting of green gram, Bengal gram, and other legumes is also practiced traditionally. This leads to an increase in vitamin C and some B group vitamins. There is a reduction in phytic acid and an improvement in Zinc absorption.

Traditional Indian diets and even snacks show that they can provide health benefits beyond nutrition. A similar trend is also seen when we think of Traditional Indian sweets. Indian sweets form one of the important constituents of diets in India.



Traditionally sweets play a major role in sharing happiness among the people and during festivals, they are also used as offerings to various deities or given in family functions like marriages (3, 4). Indian sweets vary depending on the availability of the ingredients in a particular region. They can be dairy-based, cereal and pulse-based, or fruit and vegetable-based.

Because of the variety of ingredients used, they provide many benefits. For example, dairy-based will be high in proteins, pulse-based will have high fibre, fruit, and nut-based also fibre and phytonutrients. Although they contain high sugar, the presence of fibre and protein controls the rise in sugar and are relatively safe to consume.



The evolution of sweets in India is around the festivals which will help to maintain health in that season. One such example is, Makar Sankranti is celebrated when the movement of the sun starts from the southern hemisphere to the northern hemisphere. This is the period of peak of winter in the Indian continent.

Celebration of Sankranti is done by preparing and distributing sweets based on sesame seeds and jaggery. In the western part of India, the sweet is called tilgul. This is in the form of laddu which is a combination of sesame seeds and jaggery. Sesame is a good source of fat (mostly mono-unsaturated) and contains proteins and minerals like iron and calcium. It is also a source of fibre. Jaggery which is high in sucrose along with other minerals. This specific sweet prepared by combining these two high-calorie ingredients provides energy and good nutrition which is a requirement in that season.

Similarly, traditionally many sweets and savoury items do exist which are prepared specific to the festivals in different parts of India. Their composition shows good nutrition, providing



high energy, proteins, minerals, and fibre. There is a need for systematic study of these foods to correlate the composition and their effect on health and nutrition in this large number of special festival foods in India. There are attempts to show such a correlation in a few papers in the literature on Indian sweets.

A paper on the nutrient composition of traditional festival foods of North Karnataka is published by the University of Dharwad (4). This study was on seventy-eight traditional foods (45 sweet and 33 savoury) prepared according to major festivals specific to the region.

The ingredients used were wheat gluten, gum crystals, traditional pasta products, minor oil seeds like flax seeds and niger seeds, recrystallised special sugar, safflower milk, and marking nut trees.

Major food groups used were cereals, legumes, millet, milk, vegetables, fruits, roots, and tubers.



dietary modifications by local people.

The survey was carried out in the eleven most popular sweet shops in Udaipur city.

Common processing methods used were frying (deep and shallow fat), baking, steaming, boiling, puffing, mixing, pounding, roasting, germination, and fermentation.

Nutrient composition per serving was studied. The calorific value of sweet items was between 115 to 283 Kcal per serving. It was highest in pumpkin gharage (This is a sweet made by use of pumpkin, jaggery, and wheat flour) and lowest in ground nut laddu. Bajra (pearl millet) roti specially prepared at the time of Sankranti, was found to be the most nutritious giving higher levels of energy, protein calcium, iron, magnesium, copper, and zinc as compared to other savoury foods. The traditional knowledge shows all these foods are supportive of health.

Another paper published in 2020 (5) is an ethnobotanical survey of sweets sold in Udaipur city in winter. Winter is considered a season of building immunity and year long strength through

Many sweets sold in these shops are prepared by using plant-based ingredients which people believe are beneficial for the health in winter. The survey was based on interviews with the customers and it revealed that people consume some sweets to get health benefits either prophylactic or curative or both. This is based on the traditional knowledge of the local communities. Some of these sweets were methi ke laddu, gond ke laddu, til laddu, dry fruit laddu, and amla laddu.

Indian ethnomedicine mentions the beneficial effects of these plants. Methi (fenugreek) (used in methi ke laddu) is recommended for its beneficial role in the treatment of arthritis, back pain, and joint pains. Sesame seeds used in til ke laddu are rich in calcium and are recommended for the treatment of gout and rheumatism. Also, seeds of dates consumed raw or after boiling with milk are recommended for treating asthma and colds. Since these observations are

based on traditional knowledge, detailed clinical studies will be helpful so that these sweets can be sold with additional health benefits.

There is huge potential for the packaged Traditional Indian sweets market. The market size reached INR 5320 Cr in 2022 and is expected to reach INR 15,057 Cr by 2028 (6). Another estimate for the total traditional Indian market is INR 49000 Cr in 2023 (7). When it comes to packaged foods, sweets of all kinds, (milk, cereal, besan, pulses, wheat flour, dry fruits) are packed in boxes, cans, and plastic containers. Some of the common sweets are pedhas, rasgulla, gulab jamun, barfi, soanpapdi, laddu, cham cham, raj bhog, etc.

They have longer shelf-life and can be transported to longer distances. In earlier times, the consumption of sweets and specific savouries was restricted to festivals and family functions. However, with urbanization, the trend is changing and these packaged sweets are now consumed at any season.





The acceptance of packaged sweets is better and they are viewed as safer because of the assurance that they are prepared and packed in hygienic conditions. The trend of exchanging sweets on all social occasions like weddings, festivals, celebrations, or just indulgences is on the rise. All these factors are responsible for the growth of the market.

The market potential is manifold for sweets sold in unorganized sectors where they are sold in local mithaiwala shops. This makes the future of Indian Traditional sweets very bright.



Although there is a huge scope for the growth of the Indian traditional sweets market, there are many challenges if they are to be sold as packaged foods. Challenges are on the technology side as well as the consumer side.

Consumers are indulgent in consuming sweets, but there is growing awareness about health and nutrition, especially after COVID-19. The general perception is

also rising that anything sweet may not be healthy.

This can be taken care of by taking multiple approaches.

Many sweets may support health. Earlier we have seen examples of sweets like tilgul, methi ke laddu, or using many plant-based ingredients including seeds and nuts. There is a need to have scientific studies that prove the health benefits and such kinds of products can have the advantage of these findings. Such studies can be used to increase the market share by talking about the health benefits.

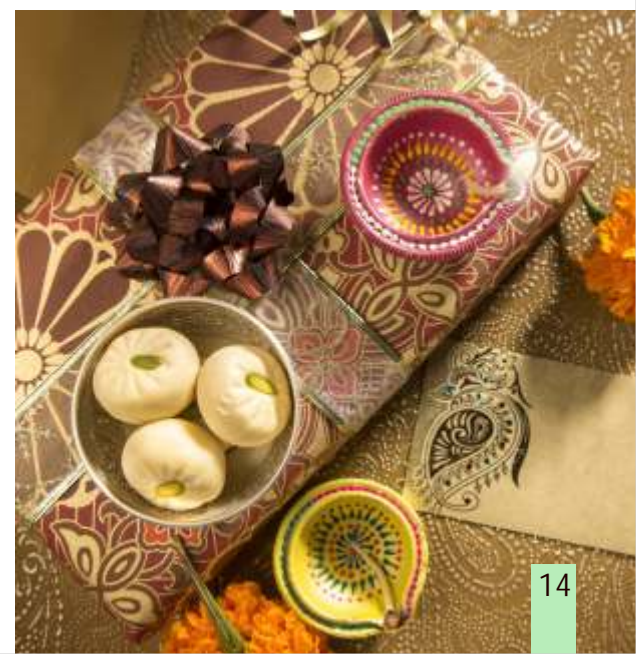
Some other kinds of sweets do have higher sugar or fat content. There is a need to reformulate these products to make them healthy. Sugar can be partly/ fully replaced with artificial sweeteners to mimic the original products in all sensory properties. Substances like polyols or FOS will give body and mouthfeel to such products.

In the case of high-fat products, the fat replacers can be used. These are challenges for product developers. Some such sweets are already developed and

are marketed.

Another challenge for food technologists and food engineers is scaling up the products so that they can be produced on a mass scale and give them longer shelf-life. Traditional sweets were made at home and all the operations were manual.

Although machines can do a faster operation, it is not easy to replicate what can be done manually. A typical example is chapatis made by rolling pin will be different than that from machine rolled. The dough mixer cannot mimic the operation to give the same texture achieved by manual kneading.





extension can be achieved by proper packaging and use of chemical preservatives.

There is very big market potential for Indian traditional sweets where the market is dominated by local mithai shops which are mostly in the unorganized sector.

Another untapped market for a variety of sweets that are available traditionally made in different parts of India. The real challenge will be cost affordability as we need to compete with the unorganized sector especially when the Indian market is cost-sensitive.

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When we look at the development of the food industry and food manufacturing equipment in India, the products that are produced on a large scale are Western foods like confectionary, and bakery where we developed the equipment required for such products.

The approach of just modifying such equipment for local foods may not work. This is a big challenge for food engineers where a lot of innovative thinking will help.

The issue of shelf-life



# RISK ASSESSMENT: THE SCIENCE OF KEEPING CONSUMERS SAFE



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Food safety, defined in law means assurance that food is acceptable for human consumption according to its intended use. Modern food safety Acts monitor food supply chains to prevent unsafe food from entering the market as unsafe food is not food. Risk analysis consisting of three interconnected components; risk assessment, risk management and risk communication, provides a comprehensive structure for food safety.

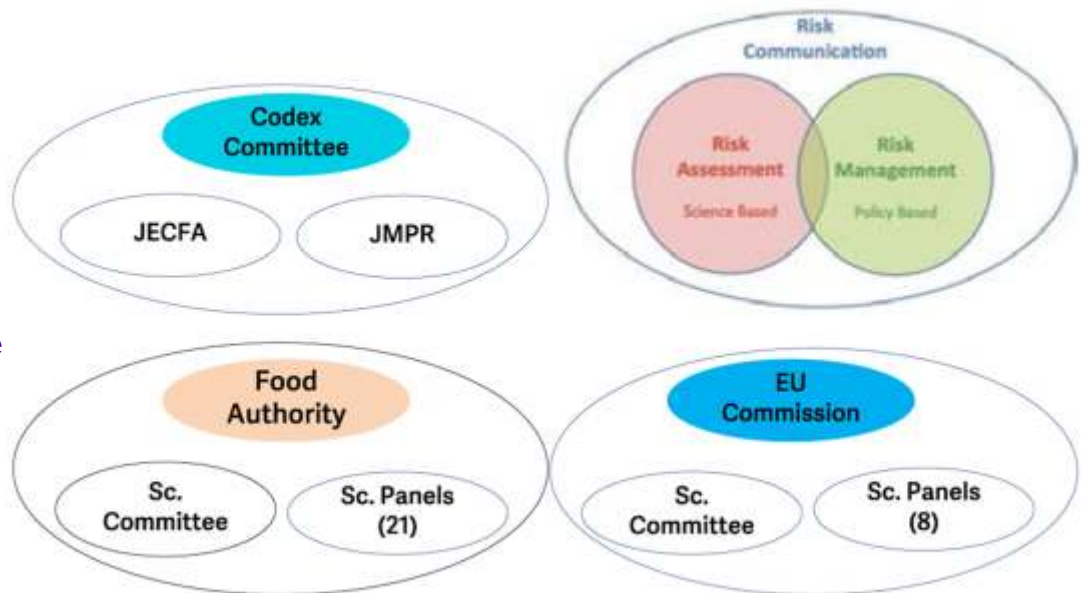
It is used for assessing and managing chemical, physical and microbiological hazards

that may be present in the supply chain. Several statutory models of science in governance are available namely, the Food Safety and Standards Act, 2006 (1), the European Food Safety Act, 2002 (2), and Codex Alimentarius among others. The similarity in structure

demonstrates the equivalence of their role and function (Fig 1).

Risk assessment is the most critical component of the three. For science to precede regulatory actions, it must be embedded in the legal process of rulemaking.

**Fig. 1 Role and function in science-based Acts**





All risk-based food safety Acts require the regulator to “follow the science” based on which decisions are made and measures if required taken. Broadly food safety covers food additives, contaminants, pesticide residues, novel and genetically modified foods, microorganisms and such processes that may result in an adverse effect. The process has four sequential steps; hazard identification, hazard characterization, exposure assessment, and risk characterization.

In plain language, the four steps are: what is there that is harmful; how severe is the harm; who is harmed, if not all; and finally am I at risk or should I be worried- is it high or low? The four steps bind a select group of experts assigned to Panels, who are knowledgeable in the relevant science domains. The process is objective, transparent and open. Evaluation of scientific data related to existing or emerging risks is their sole role and function. Much of risk assessment data is accessible through scientific opinions put out

by these expert organizations. The Joint FAO/WHO Expert Committee on Food Additives (JECFA), the European Food Safety

Authority (EFSA), and other national organisations e.g. ANSES or BfR in France and Germany publish their opinions after evaluating the available science including public consultations. For science to be independent, and free of influence, such bodies do not engage in setting standards or regulations. FSSAI has twenty-one Scientific Panels and a Scientific Committee (Fig. 1)

**What is there that is harmful:** A hazard is an inherent property of an agent - chemical, physical or biological - or a condition or situation that has the potential to cause harm when humans are exposed to that agent or condition. Often stakeholders are unable to distinguish between hazard and risk. Hazard is the potential to cause harm, while risk is the probability of harm occurring. No harm will occur unless a person consumes food with such a hazard. For proper

risk assessment, the property should describe its identity, purity and physical form to include relevant scientific data. A court annulled a ban on titanium dioxide (E 171) as the scientific opinion relied upon did not consider the toxicity due to particle size and therefore did not include the most relevant safety studies. In another review to confirm the current status of ‘ADI not specified’ for silicon dioxide (E 551), EFSA noted, that the materials used in toxicological studies were different in their physicochemical properties (i.e. particle size distribution) and the test material was not described in sufficient detail (3). Nanoparticles are considered novel foods and the characterizing of powdered substances becomes critical.

**How severe is the harm:** The role of chemistry in medicine is aptly summarized by Paracelsus. “What is there that is not poison? All things are poison and nothing is without poison. Solely the dose determines that a thing is not a poison.





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### Who is harmed, if not all:

Where there is no exposure there is no risk. Food safety concerns arise only when the

“When the hazard is characterized by a dose-response study, the threshold levels above which such adverse effects are observed provide the basis for setting up safety limits; e.g. “ no observed adverse effect level” (NOAEL). After applying a 100-fold safety factor from inter and intra-specie extrapolations, it arrives at the ADI, defined as the daily intake of an additive as an example which, over the entire lifetime of a human, appears to be without adverse effects or harm to human health.

In a recent risk assessment on vitamins and minerals, the ICMR noted that the tolerable upper level (TUL) is the maximum level of habitual intake from all sources of a nutrient to be unlikely to lead to adverse health effects. Hazard characterisation is finding or knowing when the “dose becomes a poison”. Populations are however protected even before thresholds are breached through periodic exposure assessments.

level of exposure - i.e. consumption - poses a risk. Dietary exposure refers to how much of a food chemical is consumed, while dietary intake refers to the ingestion of nutrients, including energy and water. Since food consumption data between countries and regions differ the exposure of individuals or subgroups to the same hazard varies.

The Global Environment Monitoring System (GEMS) of FAO/WHO provides an overview of 13 dietary patterns covering 183 countries to assess the potential exposure of populations to contaminants and certain nutrient substances. International risk assessment bodies routinely use these diets. Logically, higher per capita dietary energy and frequently consumed foods would significantly influence exposures. Exposure assessment is the most critical step in

the risk assessment process as the previous two steps are well established.

By combining known or published per capita consumption of foods with maximum permitted use levels (MPL) a preliminary estimate of exposures to additives, pesticides, metallic contaminants and veterinary drugs can be obtained. Where results suggest that the target substance, from all sources, is unlikely to exceed ADI or tolerable daily intake (TDI) for contaminants, these are eliminated from further consideration. If not, more accurate data on their presence or use and total diet studies (TDS) for physiological groups are required.

Even otherwise, considering India’s multicultural dietary patterns, studies for limited groups sharing well-reasoned criteria are more likely to reveal important facets of health and safety than total diet studies (TDS). Moreover, they are easier and less expensive to conduct. Many such scientific studies are available.





EFSA's scientific opinion on caffeine intake from all dietary sources noted, "Single doses of caffeine up to 200 mg (about 3 mg/kgbw for a 70-kg adult) and habitual consumption up to 400 mg per day does not give rise to safety concerns, excluding pregnant women. In a study of 180 students (4) and employed adults (13-40 years), 32.6% of students rarely used caffeinated beverages, and among the most frequent users 7.6% consumed them twice a week amounting to 21mg/day caffeine: most consumed one can at a consumption occasion. The exposure level is within the labelling advice of 150mg per day. For total intake, other sources of caffeine should be factored.

In another focused study on non-nutritive sweeteners (NNS) (5), 98.8% of participants in a diabetic clinic group and 82.7% from slimming centres consumed sweeteners daily. Around 89.6% of the diabetic group and 60.6% of the overweight group used sweeteners daily in tea and coffee. Only 9.1% of the entire group consumed foods containing sweeteners. At dedicated usage, exposures at 2.1% for aspartame (ADI 40mg/kgbw) and 2.6% for sucralose (ADI 15mg/kgbw),

are low.

Accumulation of heavy metals, particularly lead and cadmium in polluted agricultural soils leads to elevated uptake by crops and animals and affects food safety. Of the various physiological subgroups studied (6), exposure of sedentary men to lead at the 95th percentile is about 29% of the provisional tolerable weekly intake (PTWI) and cadmium is 0.3% (PTWI). Commonly consumed foods like cereals are significant contributors.

**Am I at risk:** Risk characterization is the final step. It summarizes for consumers and stakeholders, the probability and the severity of the adverse effect in humans through food consumption. It considers uncertainties in the interpretation of data and may even add on safety factors where required. While risk can be characterized either in qualitative - low, moderate or high terms - its quantitative expression is more useful. Risk-based approaches use exposure assessments to determine whether health risks exist. In a hazard-based approach the mere presence of potentially harmful agents, like allergens is considered

high risk. Ultimately risk is determined by science and proportionate measures taken accordingly.

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# TECHNOLOGY FOR FANCY AND HEALTHY BISCUITS FOR EVERYONE!



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Biscuits or as Americans call them, cookies, are foods enjoyed by all, especially children. They not just have a large number of flavour variations, there many different textures available. There are sweet, savoury and spicy biscuits with crisp, crumbly, hard, and soft textures.

However, there is such an assortment of sizes, shapes, colours and appearance that makes it interesting for all. Probably at one time, they were eaten when we were hungry but now these have become truly snack products which are consumed any

time anywhere by anyone. Such variety creates a problem with different mix and formulation. Getting the mix right using proper emulsifier makes it much easier to get the right biscuits.

Because of the popularity of biscuits with all ages, and many new varieties have been appearing, the market in India has been increasing substantially. It was around \$ 4 billion in 2019 and is estimated to be over \$ 7 billion currently (1). India is among top producers of biscuits and cookies.

Biscuits as we know are small typically hard, flat and unleavened. They could be sweet or savoury. Crackers may be leavened with baking soda or fermentation. There are different types of biscuits such as sandwich biscuits with cream inside, digestive biscuits, ginger biscuits,

chocolate chip cookies, biscotti, and many more. Actually, Americans call the flaky, tender bread rolls as biscuits and in UK it may be referred to as scones. Whatever the name be, these are very tasty snacks that are consumed increasingly all over.

## Ingredients

The basic ingredients going into making biscuits are wheat flour, fat and sugar. There are other additions depending on the type and variety. Normally three types of biscuits are made: short or soft dough biscuits, hard dough biscuits and crackers. Sweet biscuits are commonly made from short dough with higher water & fat content. Hard dough is used for semi-sweet biscuits with lower fat & sugar. Crackers may be made from fermented or unfermented hard dough are commonly puffed biscuits (2).



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Biscuits and cookies are similar but may have some differences. Biscuits are normally savoury, flaky and denser in texture, while cookies may be sweet, soft or crispy and crumbly in texture. Biscuits may have just main ingredients but cookies may have additional ingredients including sugar, butter, chocolate, nuts or dried fruit etc. Even the name biscuit may have different meaning in America. It may mean a flaky tender bread roll which may be referred to as scones in UK.

Ingredients play an important role in biscuits and cookies as the texture will be determined by a combination of these ingredients along with the baking conditions. When butter or shortening is used the texture will be crumbly and tender while oil will make a chewy or denser product. Type of flour especially protein content will determine gluten development. Biscuits and cookies normally prefer lesser protein content, more so with sweeter variety. The

higher protein forms more gluten causing shrinkage in biscuits.

When different fats are used for different varieties, emulsifiers and stabilisers play an important role in the final texture of the biscuits.

Wheat flour provides both gluten and starch. When water is added to wheat flour proteins react in presence of water to form gluten, which gives elastic dough. It can entrap gas to provide puffy structure for bread, pizza, naan or puffed biscuits. In hard and soft biscuits, it is undesirable, so low gluten flours are used. Starch gets moistened and gelatinises when heated and stiffens forming the structure of baked good.

Shortening is a tenderiser. More solid shortening entraps air when mixed or beaten; this air is released during baking when fat melts. This expands the structure when it sets, becoming crumbly and tender. When oils are used there is little expansion and biscuits are thinner and harder and crispy. Sugar besides adding sweetness has a tenderising effect. It retains moisture and makes less available for starch gelatinisation. Even after baking the sugar prevents

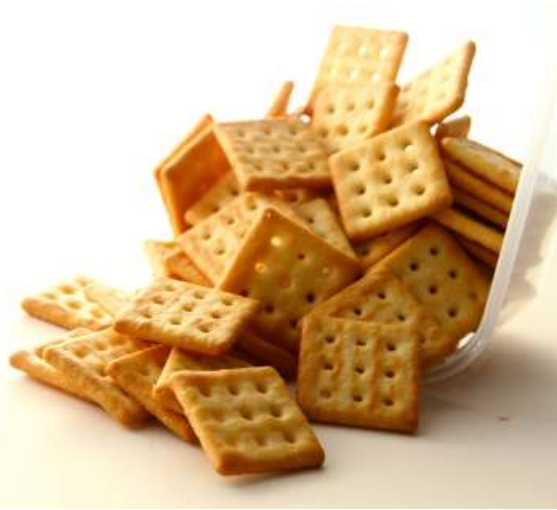
drying out of biscuits (3). Emulsifiers besides emulsification of water and fat in the dough, perform some important functions in baked goods including starch complexing, protein strengthening and aeration. They assist in blending various ingredients, and enhance the properties of shortening. They play an important role in integrity of dough and improve machinability while sheeting and moulding (4).

Emulsifiers work as dough conditioners and improve binding gluten of flour strengthening its matrix. They compensate for variation in flour quality, maintaining dough consistency, reducing breaks facilitating processing. Even in low-fat formulation, they maintain volume, tenderness and cutting properties. They reduce the variation in the final product volume and shape and texture. Low-fat products benefit from emulsifiers. Many formulations of low-fat are being developed using many different ingredients that interact with one another differently. Emulsifiers allow smoother transitions and allow these formulations possible (5).



## Emulsifiers for Biscuits & Cookies (6)

Some common emulsifiers are lecithin, mono- and diglycerides, diacetyl tartaric acid esters of monoglycerides (DATEM), sodium stearoyl lactylate (SSL). Biscuits and cookies can be improved by glyceryl mono stearate (GMS), SSL or DATEM, although others have been used.



Adding emulsifiers reduces stickiness of dough and the dough handles better giving better productivity and uniform quality. Emulsifiers also prevent biscuits drying out because they stabilise the fat and water together. This also reduces wastage due to breakage. Some emulsifiers like DATEM are thought to complex with gluten and starch in the dough strengthening their network that improves external uniformity of biscuits as well as gives better crumb structure (7). Thus emulsifiers help in many aspects of the baked goods including improving

product consistency, texture, processing stability and shelf life.

There is a trend of lowering fat contents of biscuits and cookies. This affects the texture and consistency. Use of emulsifiers allows use of lower fat formulations without appreciable change in biscuit characteristics (8, 9). As fat provides good texture and mouthfeel, in low-fat biscuits, emulsifiers are particularly necessary to obtain a good texture and eating properties. They function as fat replacers and promote fat emulsification in the dough. Both DATEM and sucrose esters have been used for this (10).

Finally, biscuits can be made with simple major ingredients, however, there is a great demand not just for varieties with inclusion of many interesting ingredients such as other cereal flours, fruits, nuts, seeds, herbs and spices and others. Also there are demands from consumers for reducing some of the ingredients such as fat and sugar for weight and other problems. Consumers are also demanding replacement of saturated fat with unsaturated ones. They want more dietary fibre in biscuits.



All these put a lot of strain on formulation of dough characteristics and baking properties and still produce biscuits that are a delight to eat. Consumers still want biscuits and cookies that are crispy, crunchy, flaky or soft/not hard, etc. They want the nutritional benefits without losing the pleasure of eating biscuits. Emulsifiers have provided a great relief to the bakers. There are many different types that work under different conditions and sometimes it is necessary to try combining.

In future, people will demand even more changes and expect bakers to produce biscuits to their liking. That is why the market of biscuits in India and globally continues to increase rapidly. There will be more and more challenges to the developers.





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# HYDROCOLLOIDS AND THE STICKY SECRETS BEHIND YOUR FAVOURITE FOODS

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Have you ever wondered what gives your favourite food that perfect texture? The chewy delight of gummy candies, the velvety smoothness of soup, the luscious spread of jam on bread, and the creamy texture of ice cream—all owe their magic to hydrocolloids. Hydrocolloids may not be a household name, but they shape the texture of our everyday foods. The name is derived from two Greek words, 'hydro' means 'water', and 'kolla' means 'glue'.

Hydrophilic colloids, commonly known as hydrocolloids, are a diverse group of substances that play a vital role in food science and various industrial applications.

Let's delve deeper into their characteristics and properties:

**1. Molecular Structure:** Hydrocolloids are typically

long-chain polymers, composed of polysaccharides (such as starches, gums) or proteins. These polymers consist of repeating units of smaller molecules linked together, forming extended chains or networks.

## 2. Water Affinity:

One of the defining features of hydrocolloids is their hydrophilic nature, meaning they have a strong affinity for water. This hydrophilicity arises from the presence of hydroxyl (-OH) groups within their molecular structure. These hydroxyl groups readily interact with water molecules through hydrogen bonding, enhancing the water-binding capacity of hydrocolloids.

## 3. Viscous Dispersions and Gels:

When hydrocolloids are dispersed in water, they form viscous solutions or

dispersions due to their ability to absorb and hold water molecules within their structure. At higher concentrations or under specific conditions, some hydrocolloids can undergo a phase transition and form gels.

## 4. Intermediate Properties:

Hydrocolloids exhibit properties that lie between those of true solutions and suspensions. While true solutions consist of solute molecules uniformly dispersed in a solvent (like sugar dissolved in water), and suspensions contain larger particles suspended in a liquid medium (like sand in water), hydrocolloids form systems



where the dispersed particles (the hydrocolloid molecules) interact with the solvent (water) to create a semi-solid or gel-like structure.

In the food industry, hydrocolloids serve as thickeners, stabilizers, emulsifiers, gelling agents, and texture modifiers, contributing to the sensory attributes, shelf stability, and overall quality of food products(1,3).

Let's look into their working mechanism in detail.

#### • Thickening Agents:

Thickening agents are essential for enhancing the texture and consistency of food products. By modifying the rheology and the viscosity of the food, they contribute to a pleasurable eating experience. These agents operate by entangling the molecules, which alters the flow and thickness of the food. In dilute solutions, these molecules move freely and do not thicken. When the concentration increases, there is less space for the particles and their movement is restricted. This transition from free

movement to the entanglement of the molecules alters the flow characteristics and thickness of the products.

Similarly, when starch is dry, its granules can absorb water and swell slightly but once cooked, the swelling is permanent, and the starch thickens the mixture. This is what makes starch an effective thickener in cooking. Starch is made up of two molecules, amylose, and amylopectin. Amylose gives a gelling effect whereas amylopectin will thicken the mixture. The greater the amylose the stronger the gel, and the greater the amylopectin the more viscous the product. Additionally, gums have a similar mechanism of action. They contain long chains of molecules that form a network when dispersed in water. This network traps water molecules, increasing the viscosity of the solution.

Furthermore, some gums, such as xanthan gum, have shear-thinning properties, meaning that their viscosity decreases under shear stress (such as mixing or blending), allowing for easier pouring and spreading while maintaining thickness when at rest.

Whether it's through entanglement or the formation of a network, hydrocolloids contribute to the desired viscosity and mouthfeel. From adding body to soups, gravies, and refreshing beverages, to enhancing the creaminess of ice cream, or stabilizing whipped toppings, the impact of thickening agents elevates the overall sensory experience (2).

#### • Gelling Agents:

Hydrocolloids thicken the solutions, but not all can form gels. When it comes to gels, these molecules entangle with each other and form 'junction zones'. Junction zones are intersections at which the molecules are connected. They play a crucial role in influencing the characteristics and functional behaviour of a gel. The more the number of these zones the more rigid the gel. Other factors influencing the formation of gel are temperature and pH. Gelatin, for instance, firms up at cooler temperatures, creating the texture we love in desserts.



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## Hydrocolloids and the Sticky Secrets behind your favourite foods



fat globules, reducing ice crystal formation in frozen desserts, and enhancing the mouthfeel of dairy products(9).

confectionery, and low-calorie foods. It has high solubility, viscosity, and emulsifying properties. It is indigestible to humans and hence has a low calorific value(4).

Whereas starch thickens up when heated which is perfect for gravy and sauces. pH plays a vital role in gelling as it influences the stability of the gel network and contributes to flavour and texture. Pectin found in fruits needs an acidic environment to form a gel. On the other hand, alginate does not rely on pH to form gels. Food manufacturers often control the pH to control the gelling process and achieve the desired texture and stability. This is particularly common in the production of jams, jellies, and gummy candies, where pH control is crucial for consistent quality(2).

### • Stabilizer/Emulsifier:

Hydrocolloids play a crucial role in stabilizing food products by preventing phase separation and maintaining uniformity in texture. They act as emulsifiers, forming a protective barrier around fat globules in liquid mixtures. This helps to stabilize emulsions and prevent the separation of fat and water phases in products like salad dressings and sauces. They improve the texture by controlling the size and distribution of

Let's explore some of the common hydrocolloids used in food products.

**Starch** is widely used as a thickening agent in food formulations. The most used are cornstarch, tapioca, and rice starches to name a few. They are used in soups, gravies, sauces, and salad dressing.

Although starches are good thickeners, they do pose some challenges in achieving the desired attributes of the product. The experts then turn to modified starches when they need precise characteristics in the product. **Modified starches** are chemically treated starches that contribute to the specific functionality of the food. One of its examples is pregelatinized starch, when added to the liquid it gelatinizes without any application of heat. These are commonly used in instant desserts(1).

**Xanthan Gum** is commonly used in the food industry for salad coatings, sauces, dairy products, gravies,

**Guar Gum** is particularly used in products such as sauces, ice creams, yogurt, and baked goods. It helps improve the texture and stability of the products.

**Locust Bean Gum (LBG)** is mostly used as a thickener or a stabilizer. It is often added to cream cheese spreads to add richness and spreadability. LBG also ensures a smooth texture in the sauce.

**Gum Arabic** is used as an emulsifying and thickening agent. It is mostly used in beverages and confectioneries like candies, chewy gum, and marshmallows.

**Carboxymethyl Cellulose (CMC)** is a synthetic gum that can be used in many products. It acts as a thickener, stabilizer, and emulsifier. It is used in fillings, puddings, and ice cream.







• **Specific Applications:**

**1. Ice creams:** The growth of ice crystals is one of the major difficulties in ice cream consumption.

Hydrophilic colloids change the rate at which water molecules adsorb onto the crystal. In addition, a gel network is formed through hydrogen bonds between hydrocolloids and milk proteins, hindering the growth of large ice crystals. The strength of the gel inhibits recrystallization. In many studies, ice crystal growth in ice was significantly delayed in samples containing locust bean gum, and xanthan gum(5).

**2. Baked Goods:** Gum guar (GG) enhances mouthfeel, rheological properties, and shelf life in baked goods by retaining moisture and delaying bread staling. Xanthan gum (XG) strengthens the dough, increases water absorption, and improves gas retention, leading to

enhanced volume and texture. It also improves adhesion, moisture retention, and spread control in batters, while contributing to product smoothness and recipe tolerance. Agar gum (AG) improves shelf life and moisture retention in bread and cake mixes, stabilizes toppings and icings, and is used in various desserts. Agar gels are especially useful in bakery glazes, icings, and fillings due to their ability to hold soluble solids(6).

**3. Confections:** Hydrocolloids are essential in confectionery for texture modification, stabilization, moisture retention, gel formation, and emulsification. They provide elasticity, chewiness, and smoothness in gummies, fruit jellies, and marshmallows. They prevent ingredient separation and crystallization, ensuring consistent texture over time. They also help retain moisture, prolonging shelf life in baked goods.



Hydrocolloids also create gels in jams, jellies, and fruit-based candies, providing structure and stability. They also improve low-calorie chocolate production, enhance chocolate viscosity, and produce softer sugar-free chocolates at optimized concentrations(7).

**4. Yoghurt and dairy products:** During yogurt production, the pH of milk drops from 6.7 to 4.3. This causes changes in the casein micelles, leading to the formation of a gel network that gives yogurt its texture. Adding different hydrocolloids changes the texture and taste of yogurt. Modified starch is used to reduce the separation of liquid in yogurt, known as syneresis. Phosphorylated starch is especially effective at reducing syneresis because the phosphate groups in the starch molecules bind to the liquid part of yogurt.



Research shows that modified starch can also attach to the casein in yogurt, preventing it from clumping together. This interaction creates a gel network that keeps the liquid in place, making the yogurt thicker and less likely to separate. Additionally, many researchers use hydrocolloids like gelatin, pectin, or modified starch to control syneresis in yogurt, with pectin and modified starch being particularly effective(5).

### 5. Emulsions and Foams:

Emulsifiers help two immiscible liquids to mix. Hydrocolloids act as stabilizers but only a few act as emulsifiers. The main job of an emulsifier is to stick to the surface of small droplets right after they form, stopping them from joining together to make bigger droplets again. If the emulsifier doesn't stick fast enough or there's not enough of it, many of the small droplets formed during mixing won't stay in the final product.

Hydrocolloids are capable of protecting droplets over a wide range of unfavourable conditions and hence act as excellent emulsifiers and stabilizers. The most widely used hydrocolloids are gum arabic, modified starch, and some kinds of pectins. Xanthan gum is especially used as a stabilizing agent(9).

### 6. Edible barrier layer films:

Edible layer film is a thin, transparent layer of packaging to prolong the shelf life. It has a neutral taste and is odourless. Hydrocolloids are added to an appropriate solvent to create a slurry. Lipids are added to increase the strength of the film. The film is formed after a very well-controlled drying process. Other substances like antioxidants and antimicrobials can be added to confer the desired property. These films act as

a stress factor. It has a low oxygen permeability which extends the shelf life of the product. Foods like fruits, vegetables, meat and meat products, seafood and its products can be protected by preventing moisture loss and reducing microbial growth thus extending their shelf life(8).

### 7. Encapsulation of bioactive compounds:

Encapsulation is a technique where the bioactive compounds are covered to protect them and improve their stability. Encapsulation methods such as using ultrasound assistance, and freeze drying are suitable to protect these compounds from degradation, enabling their use as functional ingredients in the food and pharmaceutical industries. Gelatin, guar gum, and xanthan gum are some examples that can be used to encapsulate bioactive compounds(10).

In modern days they are used not only in the food industry but pharmaceuticals and cosmetic industries as well. They contribute to the texture, stability, and functionality of various products. Understanding their properties is essential to use them efficiently in various applications. These versatile compound promises to unlock even more possibilities in shape and craft a wide array of products.



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# UNLOCKING THE NUTRIENT POTENTIAL: UNDERSTANDING ANTINUTRITIONAL FACTORS IN FOODS AND EFFECTIVE REDUCTION STRATEGIES



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When it comes to nutrition, the talk usually centres on the healthy elements of our diet: vitamins, minerals, antioxidants, and other macro and micronutrients that are essential to our well-being. But hidden among all the nutrients are compounds referred to as antinutrients, which stand as intriguing yet often overlooked adversaries to our well-being.

Antinutrients are widely distributed in a vast range

of foods and have the ability to impede the body's ability to absorb or utilize vital nutrients, hence preventing proper functioning. While many foods contain vital nutrients that are necessary for our health, the presence of antinutritional factors makes it difficult for our bodies to absorb nutrients to their potential. This article delves into the field of antinutrients, exploring their characteristics, impact on human well-being, and influence on our food preferences and habits.

It has been demonstrated that a number of antinutritional elements having the potential to be toxic are either heat-labile or heat-stable when measured in food. These elements consist of metal-binding substances, goitrogens, lectins, protease inhibitors, amylase

inhibitors, phytic acid, saponins, tannins, and gossypol. These elements, which are found in grain and legume seeds, raise concerns about nutrition and their detrimental impact on human health. Let's discuss a few commonly found anti-nutrients in foods:

## 1) Saponins:

Most plants naturally contain non-volatile glycosidic chemicals called saponins. Plant-based diets contain saponins in the form of steroids or triterpenoid glycosides. Legumes such as alfalfa, chickpeas, broad beans, soybeans, lentils, kidney beans, peanuts, sunflower seeds, ginseng roots, tea leaves, liquorice roots, spinach leaves, and quinoa seeds contain terpenoid saponins, while yam, tomato seeds, ginseng roots, fenugreek seeds,

# VITAMIN D KI TAAKAT





asparagus, and capsicum peppers contain steroidal saponins.

However various factors such as origin, plant species, environmental factors, agronomic conditions, post-harvest treatments such as the effect of processing conditions, cooking, storage, etc. are responsible for the saponin type and the final content of the saponin in food(1).

High concentrations of saponins in diet can cause many health problems. It alters the integrity of intestinal epithelial cells also affecting the absorption of Vitamin A and E along with lipids(2). Saponins are cytotoxic substances that may function as chemotherapeutic agents; however, because of their haemolytic nature, they cannot be utilized to make anti-cancer medications.

Numerous studies have demonstrated that certain

processing methods, such as cooking and soaking, lessen the amount of saponins and bitterness found in kidney beans, navy and pinto beans, peas, and other foods. Polishing was found to lower the amount of saponin in quinoa seeds and dried peas.

### 2) Phytates:

All plant-based diets often contain phytic acid, which is naturally concentrated in plant seeds, primarily in legumes, peanuts, cereals, and oilseeds.

Research claimed that phytic acid inhibits the function of enzymes required for the stomach and small intestine to break down proteins. Since phytic acid has a negative charge in most cases, it forms complexes with positively charged metal ions like zinc, iron, magnesium, and calcium that decrease the ions' bioavailability by lowering their absorption rates. Phytic acids affect the bioavailability of minerals and have a strong effect on infants, and pregnant and lactating women when large portions of cereal-based foods are consumed(2).

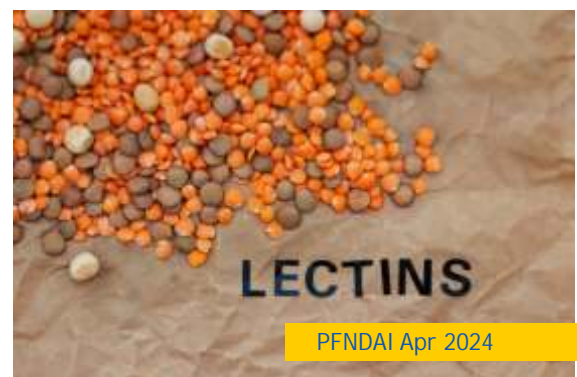
Phytates are found in the bran or aleurone layer of wheat and rice, which are commonly known as monocotyledon crops. They are easily removed during milling. However, phytates are closely associated with

proteins in dicotyledons like nuts, oilseeds, and legumes, making it more difficult to separate them using an ordinary processing technique like milling but in such cases, soaking and germination are found to be useful methods of reduction.

### 3) Lectins and Haemagglutinins:

All plants contain lectins, but whole grains like wheat and uncooked legumes (beans, lentils, peas, soybeans, and peanuts) have the largest concentrations.

Lectins have the potential to interfere with the human digestive system and in their active form might have unfavourable side effects when ingested. According to the most widely reported claims, those who consume even small quantities of raw or undercooked pulses experience severe reactions. They include phyto-haemagglutinin, a lectin type that can induce clumping of red blood cells. Additionally, it may cause diarrhoea, upset stomach, vomiting, and nausea while the less severe side effects are gas and bloating.





Active lectins have been shown to obstruct the absorption of minerals, including calcium, iron, phosphorus, and zinc, in tests conducted on animals and cells.

Lectins can attach to the cells that line the digestive tract. This could interfere with the breakdown and absorption of nutrients as well as the development and function of the intestinal flora. Long-lasting cell binding by lectin proteins has been linked to an autoimmune reaction and is thought to be involved in inflammatory diseases such as type 1 diabetes and rheumatoid arthritis(3).

It is essential to keep in mind that consuming meals high in active lectins is uncommon. Lectins are most effective when consumed raw, however, foods containing them are not usually consumed raw, which is one explanation. Most lectins can be rendered inactive by cooking, particularly when using wet high-heat techniques like boiling or stewing or soaking in water for a few hours. Foods that normally include lectins on their outer surface are water-soluble, therefore soaking them in water causes them to disappear.

During digestion, the body can create enzymes that break down certain lectins.

Other methods that render the chemicals inactive include sprouting grains and beans and mechanically extracting the lectin-rich outer hull from wheat and beans.

#### 4) Oxalates:

Oxalates are natural compounds present in fruits, vegetables, cereals, nuts, and cocoa. Foods high in oxalates include cereal grains, beets, almonds, potatoes, tea, raspberries, dates, and green leafy vegetables like spinach.

After intake, oxalate can combine with minerals to generate compounds such as iron oxalate and calcium oxalate. Although it can also happen in the kidneys and other urinary tract organs, this primarily affects the colon. Most people then excrete these substances in their urine or stools.

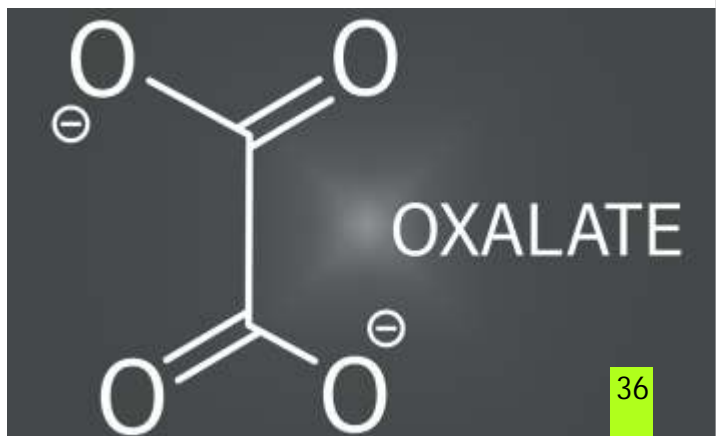
High oxalate diets, however, have been connected to a higher risk of kidney stones and other health issues in some individuals.

Small amounts of oxalate and calcium are often present in the urinary tract at the same time, but they stay dissolved and don't create

complications.

But occasionally, they bind to generate crystals. Some individuals may develop stones as a result of these crystals, particularly if their urine volume is low and their oxalate content is high. Large stones can cause excruciating pain, nausea, and blood in the urine as they pass through the urinary tract, but tiny stones typically don't cause any issues. While there are other kinds of kidney stones, calcium oxalate accounts for around 80% of them(4).

Because oxalate can bind to minerals in the intestine and hinder the body from absorbing them, this is one of the main health issues associated with oxalate. For instance, spinach has a lot of calcium plus oxalate, which blocks the body from absorbing most of the calcium.





### 3) Sprouting-

In order to germinate a seed, soak grains, legumes, nuts, and seeds in water until they start to

sprout. Vitamins, minerals, and enzymes are just a few of the nutrients that can be made more readily available through this procedure while reducing anti-nutrients.

whereas oxalates in vegetables can be reduced by boiling or blanching.

### 5) Processing techniques-

Foods that have had certain processing methods applied to them, including dehulling, grinding, or milling, may have less antinutrient content. It's crucial to find a balance because these procedures could potentially eliminate some beneficial nutrients(5).

Foods that have been blanched or boiled can have less oxalate, increasing the availability of calcium. Boiling is more efficient than steaming or baking at significantly lowering the amount of soluble oxalate.

### Various strategies for the reduction of anti-nutrients:

**1) Soaking-** Nuts, seeds, grains, and legumes can all benefit from soaking in water for several hours or overnight to help lower anti-nutrients like tannins and phytates. This procedure may facilitate better nutrient absorption and facilitate the digestion of these foods.



**4) Cooking-** Some anti-nutrients in food can be rendered inactive or have their amounts lowered by cooking. For instance, lectins in grains and beans can be reduced by boiling, steaming, or roasting,

### 6) Diet diversification-

Eating a diverse diet minimizes the effects of antinutritional factors. One can lessen the impact of anti-nutrients by eating meals that have compounds that counteract them along with foods high in nutrients. For instance, eating meals strong in vitamin C (citrus fruits) along with foods high in iron can improve the absorption of iron and mitigate the effects of phytates.

**2) Fermentation-** Foods including vegetables, dairy, pulses, and soybeans can be fermented to help break down anti-nutrients like lectins, tannins, and phytates. Additionally, fermentation increases the nutrients' bioavailability and fosters the development of healthy bacteria in the digestive system.





## 7) Genetic modification-

Phytic acid, goitrogens, glucosinolates, lectins, oxalic acid, saponins, raffinose, tannins, enzyme inhibitors, alkaloids, and other anti-nutritional substances in crops are generated in crop metabolic pathways and are coupled with other critical factors that regulate growth. Therefore, attempting to entirely eliminate anti-nutrition variables through breeding often results in the compromise of desirable traits like seed size and yield. The goal of cutting-edge methods like genomics-assisted breeding, RNA interference, integrated multi-omics, and gene editing is to eliminate undesirable traits in crops and develop novel approaches for managing them in crop development initiatives. In order to produce smart foods with the fewest limitations possible in the future, it is also necessary to prioritize individual crop-based

approaches in future research initiatives(6).

## 8) Educating the public-

Raising awareness about antinutritional factors, their effects, and ways to mitigate them can empower individuals to make informed dietary choices.

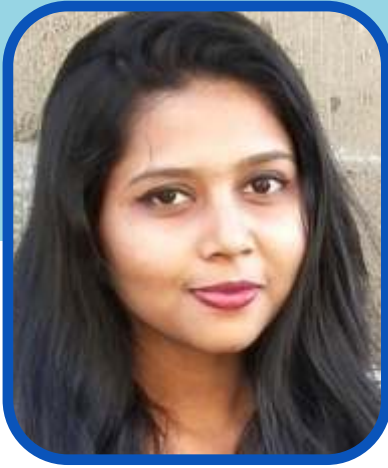
Understanding antinutritional factors in foods is essential for promoting optimal nutrient absorption and overall health. By incorporating various strategies such as processing techniques, genetic modification, and informed food pairing, it is possible to minimize the impact of these factors and ensure a more nutritionally balanced diet.

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# CONFERENCE ON TODAY'S FOODS: CONVENIENCE, SAFETY AND HEALTH SESSION 2: "EFFICACY AND SAFETY OF ADJUNCTS TO FOOD"



AUTHOR

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Protein Foods & Nutrition Development Association of India (PFNDAI) Organized a Webinar on Session 2 of TODAY'S FOODS: CONVENIENCE, SAFETY & HEALTH 'Efficacy and safety of Adjuncts to food' on 15th March 2024. The event was sponsored by Hindustan Unilever Pvt Ltd, Mother Dairy Fruits and Vegetables, Nestle India, Amway India Enterprises, Vista Processed Fruits, Fine Organics and Mondelez India Foods. The speakers for the webinar were sponsored by Amway India Enterprises.

The welcome address of the webinar was given by **Dr. Shashank Bhalkar**, Executive Director of PFNDAI. He welcomed all the delegates and attendees. He spoke about the traditional use of natural ingredients added to the food for preservation, the usage of food additives over time and their role in food preservation and processing.

He highlighted the importance of the safety of food additives and nutraceuticals for human consumption and the rigorous tests they undergo before being approved. He assured the attendees that the webinar would be knowledgeable given the



prominence of the speakers. He further acknowledged and thanked all the sponsors of the conference.

The theme address was delivered by **Dr. Jagdish Pai**, Editor at PFNDAI. He spoke about the advancements in food science and the convenience it has provided to consumers. He emphasized the importance of the safety of the food adjuncts and nutraceuticals in food. He then expressed that the webinar would be informative and the speakers, and panellists would provide valuable knowledge by answering the questions.





**Ms. Samreen Shaikh, Jr.** food technologist at PFNDAI introduced the speakers for the session, providing a brief about their background, qualifications, and expertise.



functions and uses were elaborated in detail.

The data on the world's consumption of food additives till 2020 showed that the highest consumption was of thickeners and stabilizers. The risk assessment of food additives and the complexities when it comes to the food matrix were explained.

**Dr. Govindrajan Raghavan,** Chief Innovation Officer, Kapiva Ayurveda talked about



**'Efficacy and safety of food additives.'** He started the talk by explaining the difference in efficacy between pharmaceutical products and food products. He explained the definition of a food additive and stated that they are not considered nutritional. The classification of the food additives along with their

Dr. Raghavan closed his presentation by explaining the safety evaluation sequence, the 4 basic principles of safety assessment and how an additive is considered safe based on the calculations of ADI (acceptable daily intake) and EDI (estimated daily intake).

inflammatory and anti-cancer to name a few. He then gave an example using inflammation as the marker for atherosclerosis and cardiovascular diseases. Followed by another example of diet and its effect on gut microbiome which leads to a reduction of inflammatory responses.

Clinical evidence was presented where some macronutrients and micronutrients influenced the inflammatory responses, whereas vitamins and bioactive compounds influenced anti-inflammatory responses.

**Dr. Atanu Haldar,** Senior Director, Head of R&D and Regulatory affairs, Herbalife delivered the talk on **'Role of Nutraceuticals in Chronic Systemic Inflammation'**. He first explained nutraceuticals followed by systemic inflammation, its causes, and effects. Nutraceuticals represent an active option to regulate systemic inflammation. They have shown a wide range of health effects like antioxidant, anti-



Dr. Haldar concluded the talk by stating that nutraceuticals can contribute to the state of well-being, reduce the risk of certain pathologies, and improve the quality of life.





diet were listed. An ideal diet poster from ICMR was shown, to prevent diseases and hidden hunger. She explained the importance of macronutrients and micronutrients for



**Dr. Palaniyamma Durairaj**, Senior Manager- Clinical Affairs and Nutrition, Amway Global Services India Pvt. Ltd. delivered the talk on **'Supplements for Human Health: Validation of Benefits'**.



She started the talk by presenting news articles, one of which stated that 73% of urban-rich Indians were protein deficient.

The numbers showed that many of the Indians are deficient in macronutrients as well as micronutrients. The concept of triple nutrition - Undernutrition, Hidden Hunger and Overnutrition was explained and the common nutrients that were missing from the

the proper functioning of the body. The disorders caused by vitamin and mineral deficiencies were explained in detail.

The initiatives taken by the government to resolve the nutritional problems in India were also listed. She further specified the factors contributing to the effectiveness of nutrition supplements and how validating supplements has benefits which can change and enhance public health. Dr. Durairaj concluded the presentation by talking about Personalized nutrition as an emerging trend and its implications.

After every presentation, the speakers enthusiastically answered questions raised by the attendees.

A panel discussion followed the presentations. Ms. Samreen Shaikh introduced the Panel moderator and panellists. **Dr. B Sesikeran**, Chairman, Scientific Advisory Committee, Hon. Scientific Director, PFNDAI, former director, NIN(ICMR) as the Panel moderator. **Ms. Arti Gupta**, Head of Regulatory Affairs, Abbott Healthcare Pvt. Ltd., **Dr. Vijendra Prakash**, Head- Regulatory Corporate Affairs, Himalaya Wellness Company, **Mr. Prashant Bhat**, Chief R&D Officer - Mother Dairy Fruits and Vegetables Pvt Ltd., and **Dr. Prashant Verma**, Group Lead - R&D Dabur India Ltd. as panellists.

## PANELLISTS



Dr. B Sesikeran asked the questions to each panellist alternatively. He moderated the session well and expressed his thoughts post the answers given by the speakers.



lowest level based on functionality and sensory evaluation. He also clarified that no country mandates clinical trials for supplements, but regulators may require safety studies for new ingredients.

Dr. Vijendra Prakash discussed the benefits of a balanced plant-based diet for controlling NCDs and the impurities in nutraceuticals made from plant materials. He highlighted the importance of reducing these contaminations to ensure the safety of the products.



Ms. Arti Gupta explained that clinical trials are conducted by independent Clinical Research Organizations (CROs) and supervised by an ethics committee. She also discussed the difference between food and drug clinical trials, with nutraceuticals falling between the two.



Dr. Prashant Verma discussed the GMP quantity for additives in dietary supplements, stating that they should be added at the



Dr. Prashant Bhat talked about the natural ingredients used as food additives



in earlier times and traditional methods of preservation, mentioning Ayurveda's contribution towards the same.

At the end of the session, **Ms. Simran Vichare**, Nutritionist, PFNDAI gave a vote of thanks to webinar sponsors, speakers, and panellists, along with her PFNDAI team members for making the conference a success. She also thanked the attendees for patiently attending both the sessions of the conference.



The entire webinar recording is available on the following link: <https://fb.watch/qWfqDzqZnn/>



# REGULATORY ROUND UP

Dear Readers,

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

[Implementation of Fortified Rice Traceability \(FoRTrace\) Application within FoSCoS:](#)

Fortified rice Traceability application (FoRTrace) is integrated with FoSCoS. This IT application will help bring transparency in record keeping by integrating various stakeholders engaged in the production, raw material utilization, and sales of Fortified Rice.



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[List of FSSAI notified laboratories for testing of micronutrients](#)

[in Fortified Rice \(FR\), Fortified Rice Kernel \(FRK\) and Vitamin-Mineral Premix for Fortified Rice Kernel:](#)

A list of the FSSAI approved laboratories for testing Vitamin B 12 and B9 in Fortified Rice and Fortified Rice Kernel, Vitamin-Mineral premix for FRK is published.

[Re-operationalisation of FSS \(Foods for Infant Nutrition\) Amendment Regulations,](#)

[2022 to revise limits of Selenium, Manganese,](#)

[iron and biotin:](#)

FSS (Foods for Infant Nutrition) Amendment Regulation 2022, is being finalized and the process may take some more time. Given this, revised limits of Selenium, Manganese, Iron, and Biotin are re-operationalised from 1st October 2023.

[Re-operationalization of Draft FSS \(Food Product Standards and Food Additives\) Amendment Regulations related to standards of Packaged Drinking Water \(other than Mineral Water\):](#)

The final amendment regulations on Packaged Drinking Water are approved by Food Authority and they are yet to be published in the Gazette. Until then, the limits for Total Dissolved solids, Calcium, and magnesium for Packaged drinking Water are re-operationalised from 01.01.2024.

pending approval with the Food Authority. This order is an active list published by Food Authorities of all the Processing Aids that are allowed to be used by FBOs.



[Processing Aids under Food Safety and Standards \(Food Products Standards and Food Additives\) Regulations, 2011:](#)

Many processing aids that are considered by the Working Group on Processing Aids and Scientific Panel are yet to be included in the Gazette officially and are

[Food Product category for Edible Dried Fruits/ Vegetable Seeds for the purpose of Licensing through FoSCoS:](#)

The order is about including these two product names in FoSCoS system under the categories 4.1.2.2 (fruit seeds) and 4.2.2.2 (vegetable seeds). This will help FBOs to apply for the license till the specific standard is notified for this category.

[Requirement of integrated veterinary health certificate for import of milk and milk products into India:](#)

The mandatory requirement of integrated veterinary certificate for importing milk and milk products is extended till 30th June 2024. All consignments with a bill of landing after 30 June 2024 are to be accompanied by the Integrated Health Certificate. It appears that there will be no further extension.

[Validity of FSSAI recognised Food Testing Laboratories:](#)

A list of FSSAI-notified laboratories and their validity of NABL accreditation as of 13th March 2024 is published.



# RESEARCH IN HEALTH & NUTRITION

## Beyond infant formula: Industry predicts HMO growth in gut health and immunity

25 Jan 2024 Nutrition Insight

Human milk oligosaccharides (HMOs) — found naturally in human breast milk — are increasingly common in infant dairy formulations looking to offer nutritional benefits similar to natural breastfeeding. Nutrition Insight speaks to infant nutrition experts from Chr. Hansen, dsm-firmenich and Kyowa Hakko Bio to discuss the latest in HMOs development and application in and beyond infant nutrition.

“HMOs have been authorized for usage in multiple food categories — from early life nutrition to medical nutrition, from multiple conventional foods and beverages to dietary supplements, targeting a wide range of potential consumers from infancy to elderly populations,” says Dr. Marta Miki, senior

regulatory and scientific affairs manager at dsm-firmenich.

“The main focus in the market remains the application of HMOs in infant formula,” adds Veronika Müller-Wigger, head of commercial development and marketing, HMOs, at Chr. Hansen. “We can see application expansion of HMOs from regular infant formulas into hypoallergenic infant formulas, ‘food for special medical purposes’ formulas and toddler milk products. We also see growing interest in research outside of infant formula products and in children and adult populations.”

“As research on HMOs progresses, they are expected to act as ‘functional ingredients’ in addition to nutrients for infants,” comments Dr. Eri Nakazaki, senior scientist and manager of the corporate strategy department at Kyowa Hakko Bio. “In addition to their

application in powdered infant formula as ingredients in breast milk, we envision their application in functional supplements and functional foods in the future.”

Discussing the importance of HMO ingredients and their known role in infant health and development, Miki points out that “it is well established that exclusive human milk feeding for the first six months of a child’s life is the gold standard of infant nutrition.”

“Compared to formula-fed infants, exclusively breastfed infants have fewer infections, a distinct microbiota and modestly improved cognitive outcomes. There are many factors associated with breastfeeding — scientists look toward components found in human milk that are lacking or inadequate in infant formula to help explain these differences and hopefully help to close the gap between breastfed and formula-fed infants.”



“They may also play a role in brain development. The HMOs now approved by Food Standards Australia New Zealand (2’FL/DFL, LNT, 6’S and 3’S) have been studied in the largest infant clinical trial of HMOs and shown to be safe and well tolerated, as well as supporting normal physical growth, soft stools, a bifidogenic microbiota, gastrointestinal health and the developing immune system.”

By Milana Nikolova

## Stress-relieving potential of saffron

23 Jan 2024 Nutrition Insight

A new *in vitro* study on the stress-release properties of saffron extract presents evidence that affron — a standardized extract of saffron developed by Pharmactive Biotech Products — may enhance the body’s resilience to stress.



The findings reveal significant improvements in stress model animal subjects with the oral administration of the extract. The results obtained from the present study allow us to know the mechanisms of action of affron on the hypothalamic-pituitary-adrenal (HPA) system, specifically in the release of

several hormones related to the regulation of this system in occasional stress situations,” Inés Morán, R&D and scientific studies manager for Pharmactive, tells *Nutrition Insight*. “To evaluate the effect on the stress caused, different parameters have been measured such as Brain-Derived Neurotrophic Factor (BDNF), the release of Arginine Vasopressin (AVP), the release of adrenocorticotropin hormone (ACTH) or the expression of glucocorticoid receptors,” she adds.

The study conducted in South Korea and published in the journal *Nutrients* focuses on affron’s role in regulating the HPA axis. This major brain signalling system controls reactions to stress. It is essential to survival in life-threatening situations, as its activation provides the energy for a “fight or flight” response. However, a chronic elevation of the stress hormone cortisol can reduce overall well-being.

The study was conducted on 40 Wistar rats divided into four groups, of which three were subjected to several standardized stress tests during a four-week period.” The methodology used was

based on subjecting the different groups of rats to a stressful situation, such as sleep, food and drink deprivation at certain times of the day,” outlines Morán. “Afterwards, the rats were treated or not — depending on the experimental group — with two concentrations of affron.”

The two groups receiving affron experienced a decrease in the presence of arginine vasopressin and Corticotropin-Releasing Factors (CRF) within the hypothalamus, which are important for the release of other stress-related hormones, such as ACTH from the pituitary gland. In turn, ACTH signals the adrenal glands to release cortisol. Morán explains: “It has been observed that it increases the BDNF, related to neuronal plasticity and decreases the release of AVP, which is increased in periods of occasional stress. In addition, the release of ACTH, the hormone responsible for producing cortisol in periods of occasional stress, is decreased.”

By Milana Nikolova





## Spirulina: A natural solution to weight loss and heart health

23 Jan 2024 Nutrition Insight

The health benefits of spirulina (*Arthrospira platensis*) supplementation have been more closely assessed for its effects on cardiometabolic disease by researchers from Qatar University.

The effect of spirulina supplementation on body weight parameters has been explored in multiple clinical trials. The researchers found that this blue-green alga, or filamentous cyanobacterium originating from lagoons in Latin America and Africa, effectively reduces body weight, body mass index and waist circumference, with a potential dose-dependent effect.

Nutrients such as phycocyanin, gamma-linolenic acid and vitamin B12 in the spirulina contribute to its cardiometabolic benefits. It decreases interleukin 6, an important biomarker of body inflammation, by restricting the nicotinamide adenine dinucleotide phosphate (NADPH) oxidase

enzyme and lowering insulin resistance. According to the report, spirulina is gaining attention for its unique chemical and nutritional composition. It has been recommended as

a food supplement by NASA and the European Space Agency for long-term space trips. The algae is valued as a low-cost nutritional supplement with no side effects.

Spirulina has been used in nutrition for a long time because it is high in protein, is easy to digest and has a balanced amino acid profile. It contains vitamins, carotenoids, minerals, essential fatty acids and polysaccharides. The most significant wave of spirulina popularity occurred in the 1960s and 70s when scientists explored microalgae cultivation as a source of single-cell protein.

Today, spirulina is emerging "as a promising dietary intervention in addressing cardiometabolic risk factors." Multiple clinical trials showed consistent benefits in reducing body weight, enhancing lipid profiles and improving inflammation markers and glucose metabolism. In addition, microalgae are making waves for their highly nutritious content

and status as a natural, plant-based and sustainable "superfood biomass." But the industry still has a long way to go to bring these ingredients fully into mainstream human consumption, say industry stakeholders.

By Inga de Jong



## Latest research confirms multivitamins can enhance cognitive health in seniors

19 Jan 2024 Nutrition Insight

The third COcoa Supplement and Multivitamin Outcomes Study (COSMOS) underscores the potential of daily cocoa extract and multivitamin supplements in improving memory and slowing cognitive aging in older adults.

This research included 5,000 participants, of whom 573 were subject to in-person assessments over two years, and was conducted by Mass General Brigham, the US non-profit health care research and provider.

“Cognitive decline is among the top health concerns for most older adults, and a daily supplement of multivitamins has the potential as an appealing and accessible approach to slow cognitive aging,” says lead author Chirag Vyas, instructor in investigation at the Department of Psychiatry at Massachusetts General Hospital, a founding member of the Mass General Brigham healthcare system. According to the publication in *The American Journal of Clinical Nutrition*, these findings could be significant in mitigating cognitive decline, as nearly one in four US citizens will face an elevated risk by 2060.



The initial COSMOS trial utilized in-person cognitive assessments, telephone-based assessments and web-based evaluations. Next, an in-clinic study, COSMOS-Clinic, demonstrated the benefit of multivitamins in terms of global cognition, observing a statistically significant benefit for episodic memory but no notable improvement in executive function and attention.

A meta-analysis combining data from the in-clinic study with the previous telephone-based (COSMOS-MIND) and web-based (COSMOS-Web) assessments revealed consistent and statistically significant benefits for both global cognition and episodic memory. The authors estimate that the daily multivitamin slowed global cognitive aging by the equivalent of two years when compared to a placebo.

“The meta-analysis of three separate cognition studies provides strong and consistent evidence that taking a daily multivitamin, containing more than 20 essential micronutrients, helps prevent memory loss and slow down cognitive aging,” Vyas says.

“These findings will garner attention among many older adults who are, understandably, very interested in ways to preserve brain health, as they provide evidence for the role of a daily multivitamin in supporting better cognitive aging,” Olivia Okereke, senior author of the report and director of Geriatric Psychiatry at Massachusetts General Hospital adds.

By Milana Nikolova



## Higher plant-based protein intake linked to healthier aging in women

18 Jan 2024 Nutrition Insight

Women who consume higher amounts of protein, especially protein from plant-based sources, develop fewer chronic diseases and are more likely to be healthier overall as they age, according to a new study conducted by researchers at the Jean Mayer USDA Human Nutrition Research Center on Aging (HNRCA) at Tufts University.

“Consuming protein in midlife was linked to promoting good health in older adulthood. We also found that the source of protein matters. Getting the majority of your protein from plant sources at midlife, plus a small amount of animal protein, seems to be conducive to good health and good survival to older ages,” says Andres Ardisson Korat, a scientist at the HNRCA and lead author of the study.



Self-reported data from more than 48,000 women, between 38-59, were analysed, showing visibly less heart disease, cancer, diabetes and cognitive and mental health decline in those who included more protein in their diets from fruits, vegetables, bread, beans, legumes and pasta compared to those who ate less. Researchers examined thousands of surveys collected every four years from 1984 to 2016 on how frequently people ate certain foods to pinpoint dietary protein and its effects on healthy aging. They calculated protein intake by multiplying the number of times each food item was consumed by its protein content.

The researchers compared the diets of women who had not developed chronic diseases or lost physical function and exhibited no mental decline with those with these ailments. Women who ate more plant-based protein – defined in 1984 as protein obtained from bread, vegetables, fruits, pizza, cereal, baked items, mashed potatoes, nuts, beans, peanut butter and pasta – were 46% healthier

at a later age. The women who consumed more animal protein, such as beef, chicken, milk, seafood and cheese, were 6% less likely to be healthy when they got older. “Those who consumed greater amounts of animal protein tended to have more chronic disease and didn’t manage to obtain the improved physical function that we normally associate with eating protein,” says Ardisson Korat.

By Inga de Jong

### Omega-3 fats may slow fatal pulmonary fibrosis by improving lung function

04 Jan 2024 Nutrition Insight

**New research links omega-3 fatty acids found in nuts and fish to improved lung function, which can slow the progression of the often-deadly pulmonary fibrosis and prolong the lifespan of patients living with this lung scarring disease without needing an organ transplant.**

Pulmonary fibrosis is a life-long condition resulting in the inability of the lungs to exchange oxygen and carbon dioxide, which leads to patients becoming short of breath, weak and unable to

exercise, among other symptoms. Smoking is a considerable risk factor.

“Similar to prior research that has shown higher blood levels of omega-3 fatty acids are associated with better lung function in community-dwelling adults, we also found that higher levels were strongly associated with better lung function over time in humans with pulmonary fibrosis,” Dr. John Kim, a pulmonary and critical care expert at UVA Health and the School of Medicine, US, tells Nutrition Insight. “Specifically, we found patients with higher omega-3 levels had a slower decline in their ability to exchange oxygen and carbon dioxide. Notably, we found higher levels were associated with longer survival.”

The research team conducting the study published in CHEST set out to determine if omega-3 fatty acids could offer protection from interstitial lung disease that can eventually lead to fatal pulmonary fibrosis.



“Our findings extended other research that has shown higher blood levels of omega-3 fatty acids are associated with better lung function and clinical outcomes in other types of lung diseases,” explains Kim.



The research was conducted by collecting blood samples from more than 300 clinically diagnosed pulmonary fibrosis patients and examining the associations of plasma omega-3 fatty acid levels with changes in the Forced Vital Capacity — the amount of air that can be forcibly exhaled from a person’s lungs after taking the deepest breath possible — and capacity for carbon monoxide over a 12-month period.

“Our study was largely correlative, so we don’t exactly know the precise role of omega-3 fatty acids in interstitial lung disease,” notes Kim. “Notably, there are published studies from other researchers that have shown the administration of omega-3 fatty acids to be protective in the lungs of

mice, and part of this may be due to the metabolites of omega-3 fatty acids. There’s a possibility that higher blood levels of omega-3 fatty acids may indicate better health habits that may influence pulmonary fibrosis, and there is, in fact, no direct role of omega-3 fatty acids,” he adds.

By Milana Nikolova

### Research linking Social Anxiety Disorder to gut microbiota health could pave the way for a novel treatment

03 Jan 2024 Nutrition Insight

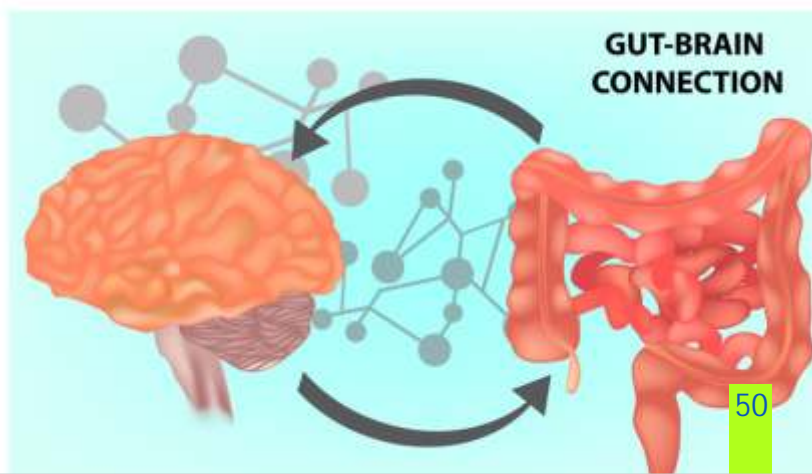
People living with Social Anxiety Disorder (SAD) have a microbiota composition different from that of healthy individuals, researchers based in Ireland found.

SAD patients’ microbiota were inserted into the guts of mice, which led to an increased sensitivity to social fear and changes to stress and immune functions. “SAD is an increasing issue for the human population, so it is vital to explore new treatments to address the condition,” says professor John F. Cryan,

research lead, principal investigator at the APC Microbiome Ireland and VP for research and innovation at the University College Cork. “Discovering a link between the microbiota and the SAD condition is a significant breakthrough — the microbiota presents a potential therapeutic target.”

“SAD has become a pertinent issue, it causes fear and anxiety in common social situations, which can be very debilitating and negatively impact quality of life,” adds co-author Dr. Nathaniel Ritz. “Our study shows that the microbiota in SAD is capable of driving symptoms characteristic of the disorder. This makes for exciting possibilities in the effort to develop therapeutics for patients suffering with SAD.” The study published in PNAS put forward that interkingdom — the communication between bacteria and their hosts — is a vital aspect of social fear responses and suggests the microbiome as a therapeutic target for SAD.

By Milana Nikolova





## Pomegranate extract improves microbiome and SCFA production

03 Jan 2024 Nutrition Insight

A recent human clinical study of 18 women and the effect of *Pomella* pomegranate extract from Verdure Sciences showed significant improvements in gut and mitochondrial health markers.

According to the multi-disciplinary research team, *Pomella* supplementation augments circulating short-chain fatty acids (SCFAs) through modulation of the gut microbiome as one of the mechanisms. The findings further suggest that consumption of the extract supports a healthier gut-body communication. Study participants who took 250 mg of pomegranate extract daily for four weeks experienced significant benefits in gut microbiome composition, circulating SCFAs and gut-derived ellagitannin metabolites like urolithins. The findings were published in MDPI.

“The support for the gut microbiome, SCFAs, metabolic health, mitochondrial and cellular support are all areas we

have seen previous data support. This study helps bolster an already interesting story, making it much more compelling,” says Kristen Marshall, digital marketing

manager for Verdure Sciences. The researchers used whole-genome sequencing to analyse study samples. While there were no significant changes in the placebo group, there was a substantial change in the treatment group’s SCFA profiles, including a 162% increase in the propionate level and a 38% increase in the acetate level.

Pomegranate fruit has been used for centuries in folk medicine to treat various ailments. The fruit is considered a superfood because of its antioxidant properties and is a rich source of vitamins, minerals, polyphenols, sugars, organic acids, fatty acids and phytonutrients. “Oral supplementation of *Pomella* leads to significant shifts in the gut microbiota, increases the circulating plasma levels of short-chain fatty acids such as propionate and acetate and increases the plasma levels of urolithin A levels,” the study authors state.

The researchers also observed an increase in gut

microbial species such as *Coprococcus eutectus*, *Roseburia faecis*, *Roseburia inulinivorans*, *Ruminococcus bicirculans*, *Ruminococcus calidus*, *Faecalibacterium prausnitzii*, *Methanobrevibacter smithii* and *Collinsella aerofaciens*. These bacteria are believed to have modulated the short-chain fatty acids, secondary metabolites and urolithin A synthesis within the treatment group. “Our results demonstrate a significant increase in the abundance of multiple short-chain producing bacteria in the gut microbiome of the pomegranate extract group along with an increase in the circulating acetate and propionate levels,” the researchers say.

By Inga de Jong

## Healthy diet early in life seems to protect against inflammatory bowel disease

Science Daily January 31, 2024

Having a high dietary intake of fish and vegetables at 1 year of age, and a low intake of sugar beverages, seems to protect against inflammatory bowel disease.





These are the findings of a study with more than 80,000 children conducted at the University of Gothenburg.

The global rise in inflammatory bowel disease (IBD), which includes Crohn's disease and ulcerative colitis, has no clear explanation. A contributing factor is thought to be dietary patterns that affect the bacteria in the gut, the gut microbiota, which is particularly sensitive during the first years of life. Previous research has looked at dietary patterns and IBD in adults, but research on children's diets and links to IBD are scarce.

The aim of the current study, published in the journal *Gut*, has been to increase knowledge in this area. The study's final analysis includes dietary information on 81,280 1-year-olds in Sweden and Norway. The data on the children included come from the two population studies: All Children in Southeastern Sweden, ABIS, and the Norwegian Mother, Father and Child Cohort Study, MoBa.

Parents were asked specific questions about their children's diet at 12-18 and 30-36 months of age. Diet quality was assessed using a child-friendly version of the Healthy Eating Index tool, which looks at the quality of

the whole diet. Diet quality was systematically scored and classified as either low, medium or high. Higher quality equalled a higher intake of vegetables, fruit, dairy products and fish, and a lower intake of meat, sweets, snacks and sweet drinks.

Intakes of individual food groups were also studied. Data on breastfeeding, and the child's intake of formula and antibiotics exposure were also included. Children's health was monitored from the age of 1 and for an average of 21 years for ABIS and 15 years for MoBa, until the end of 2020/2021. During this period, 307 of the participants were diagnosed with IBD, with 131 having Crohn's disease, 97 having ulcerative colitis and 79 having an unclassified IBD.

The incidence of IBD was higher in the Swedish ABIS study than in Norwegian MoBa cohort, probably due to the longer follow-up time in ABIS. High fish intake at age 1 year, compared to a low intake, was associated with a 54% lower risk of ulcerative colitis. High vegetable intake at 1 year of age was associated with an overall reduced IBD risk. High intake of sugar beverages, compared to a low intake, was accompanied by a 42% increased risk of IBD.

Switching to vegan or ketogenic diet rapidly impacts immune system  
Science Daily January 30, 2024

Study finds distinct immune responses occur quickly when diets change, more research needed to determine health effects

The study conducted by researchers at the National Institutes of Health provides valuable insight into the rapid and distinct immune system changes that can occur when individuals switch to a vegan or keto diet. The findings suggest that the vegan diet may stimulate innate immunity, providing a non-specific first line of defence against pathogens, while the keto diet may enhance adaptive immunity, which is essential for building pathogen-specific immunity. These responses are thought to be influenced by metabolic changes and shifts in the participants' microbiomes, highlighting the complex interplay between diet, the immune system, and overall health.



The study was conducted by researchers from the NIH's National Institute of Allergy and Infectious Diseases (NIAID) and National Institute of Diabetes and Digestive and Kidney Diseases (NIDDK) at the Metabolic Clinical Research Unit in the NIH Clinical Center. The 20 participants were diverse with respect to ethnicity, race, gender, body mass index (BMI), and age. Each person ate as much as desired of one diet (vegan or keto) for two weeks, followed by as much as desired of the other diet for two weeks. People on the vegan diet, which contained about 10% fat and 75% carbohydrates, chose to consume fewer calories than those on the keto diet, which contained about 76% fat and 10% carbohydrates. Throughout the study period, blood, urine, and stool were collected for analysis.

The study's use of a multi-omics approach to analyse various biological responses offers a comprehensive understanding of how different diets impact the body at a cellular and molecular level. The results underscore the need for more research to determine

the long-term effects of these dietary interventions and their potential applications in preventing or managing diseases such as cancer and inflammatory conditions. By uncovering the intricate mechanisms through which diets influence the immune system and microbiome, this study opens new avenues for personalized nutrition interventions that could optimize health outcomes and improve disease management strategies.

### Study urges people to think twice before going on a diet

Science Daily January 29, 2024

**The study underscores the importance of promoting body positivity and self-acceptance, rather than perpetuating harmful diet culture.**

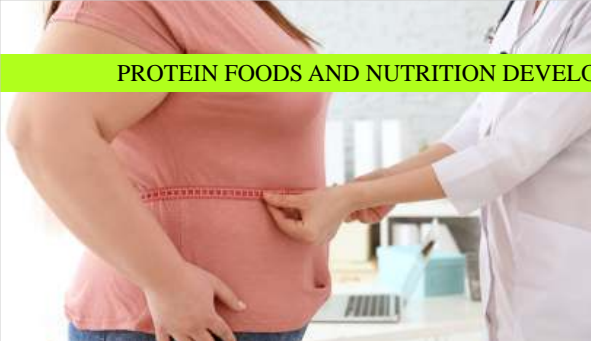
By focusing on health and well-being, rather than achieving a specific number on the scale, individuals may be able to break the cycle of yo-yo dieting and develop a healthier relationship with food and exercise. Encouraging a balanced approach to nutrition and fitness, as well as practicing self-compassion and mindfulness, may help individuals avoid

the negative consequences associated with weight cycling.

For the study, researchers conducted in-depth interviews with 36 adults -- 13 men and 23 women -- who had experienced weight cycling where they lost and regained more than 11 pounds. The goal was to learn more about why and how people entered the yo-yo dieting cycle and how, if at all, they were able to get out of it. All the study participants reported wanting to lose weight due to social stigma related to their weight, and/or because they were comparing their weight to that of celebrities or peers. "Overwhelmingly, participants did not start dieting for health reasons, but because they felt social pressure to lose weight," Romo, corresponding author of a paper on the study and an associate professor of communication at North Carolina State University, says. The study participants also reported engaging in a variety of weight-loss strategies, which resulted in initial weight loss, but eventual regain.







Overall, the study highlights the need for a cultural shift away from unrealistic beauty standards and the pressure to conform to societal expectations. By challenging toxic dieting behaviours and promoting a more holistic approach to health and wellness, individuals may be able to break free from the harmful cycle of yo-yo dieting and prioritize their overall well-being. Through education, support, and advocacy, we can work towards creating a society that values self-care, self-acceptance, and positive body image.

### Ashwagandha Extract May Offer Anti-Fatigue Benefits to

### Overweight Subjects

01.29.24 Nutraceuticals World

The findings from this randomized, double-blind, placebo-controlled trial provide compelling evidence for the potential efficacy of ashwagandha extract in reducing fatigue and stress levels among overweight or mildly obese men and women aged 40-75 years.

The significant decrease in the Chalder Fatigue Scale (CFS) score and improvements in the Patient-Reported Outcome

Measurement Information System-29 (PROMIS-29) scores suggest that ashwagandha may indeed help to combat fatigue, restore vitality, and promote overall well-being.

Researchers evaluated the safety of this ashwagandha and its impact to perceived fatigue and stress in 111 healthy men and women, aged 40-75 years old, experiencing low energy and moderate-to-high perceived stress over a 12-week period. The study used a dosage of 200 mg ashwagandha twice a day. Witholytin is standardized to 1.5% total withanolides from the roots. Results, published in Journal of Psychopharmacology, indicated a significant 45.81% decrease in the total score of the Chalder Fatigue Scale (CFS) and a non-significant 38.59% reduction in stress levels, as measured by the Perceived Stress Scale, for participants taking ashwagandha compared to their baseline scores after 12 weeks. Additional results saw an

11.41% increase (improvement) on physical score in the PROMIS-29, a 26.30% reduction on mental score (improvement) in PROMIS-29, and a 9.1% increase in Heart Rate Variability (HRV) compared to a 18.8% reduction in the placebo group.

The sub-analysis exploring hormone biomarkers in male participants further adds to the potential benefits of ashwagandha, with significant increases observed in testosterone and luteinizing hormone levels. This suggests that ashwagandha supplementation may have additional benefits beyond reducing fatigue and stress, potentially impacting hormone levels in a positive manner. These findings open up new avenues for research into the specific demographic groups that may benefit most from ashwagandha supplementation, paving the way for future studies to explore its effects on various populations and health conditions.



# FOOD SCIENCE & INDUSTRY NEWS

## Scientists urge climate-smart agriculture to prioritize nutritional quality

05 Jan 2024 Nutrition Insight

Researchers assessing climate-smart agriculture and nutrition security in sub-Saharan Africa are calling for farmers in the region to diversify their agricultural production toward climate-smart and micronutrient-rich crops such as soybeans, cassava, millet and sorghum in a bid to improve health outcomes.

The research paper outlines that relying on fewer crops would likely increase the risk of obesity and associated non-communicable diseases, such as type 2 diabetes, cardiovascular disease and some forms of cancer.

"Transformative (or transformational) adaptation often involves growing new crops in new areas, rather than making changes (such as planting date shifting) to how the current suite of crops are grown," Dr. Stewart Jennings, study lead and research fellow at the University of Leeds, UK, tells Nutrition Insight.

"Growing a range of crops means that if some go badly in a given year, others may fare better. We need a greater diversity of staple crops (such as millet, sorghum, cassava) and greater fruit and vegetable production to help ensure nutrition security." The study published in Nature Food emphasizes the need for local stakeholders to take the lead in ensuring the transformative adaptation of food systems.

Over 50 researchers took part in the study, involving policymakers and other stakeholders in the food and agriculture sectors in four countries in sub-Saharan Africa: Malawi, South Africa, Tanzania and Zambia.

"Stakeholders co-designed the scenarios that were the focus of the analysis. Climate change risks were seen as the main challenge to the future food system in all countries.

The extent of adoption of new agro-technologies and how transformative adaptation to climate change is were seen as key challenges and opportunities that had substantial impacts on future nutrition security," Jennings explains. Discussing examples of successful transitions to

more diverse food systems in the countries studied and the resulting impact on nutrition security, he points out that "soybean is a crop on the diversification agenda in Zambia."

The study spotlights the Zambian National Agricultural Policy (2004), its Second National Agricultural Policy (2016) and the Zambia Soybean Strategy and Investment Plan (2022), which aim to provide a framework for crop diversification with the specific goals of improving food and nutrition security and agricultural transformation.

By Milana Nikolova

## Going beyond plastic: Chung-Ang University team explores tara gum as a green polymer

CHUNG ANG UNIVERSITY 15-JAN-2024 Eurekalert

Tara gum, derived from the seeds of the tara tree (*Caesalpinia spinosa*), is a natural, water-soluble substance that contains

polysaccharides (complex carbohydrates), including the widely used “galactomannan,” which is employed in coatings, edible films, and as a stabilizer and thickener. The utilization of tara gum in place of synthetic plastics not only offers a sustainable solution to environmental pollution but also provides a multitude of benefits in diverse industries. Its biodegradability and biocompatibility make it an attractive option for applications in food and drug delivery. Moreover, the ability to tailor its properties through various modification methods opens up a wide range of possibilities for innovative uses in these sectors.

The comprehensive review published in Volume 323 of Carbohydrate Polymers, a team of researchers, led by Professor Sangkil Lee from Chung-Ang University in the Republic of Korea sheds light on the advancements in tara gum research and highlights its potential in the food and pharmaceutical industries. The exploration of modified derivatives of tara gum and their application in developing pH-sensitive food packaging and drug delivery systems showcases the versatility and effectiveness of this natural polymer. With further research and development, tara gum could pave the way for sustainable and environmentally friendly solutions in the global fight against pollution and health risks.

### Greener and feasible production: Enzymatic methods for mono- and diacylglycerol synthesis in the food industry

Henan University of Technology  
from EurekaAlert 2 Jan 2024

Monoglycerides (MAGs) and diacylglycerides (DAGs) play important roles in various industries such as food, cosmetic, and others.

MAGs are essential emulsifiers, while DAGs are functional cooking oils that can reduce body fat and serum TAGs. However, their natural concentration in oils is low, leading to extensive research into enzymatic production methods to meet global demand.

A recent review in the Grain & Oil Science and Technology journal highlighted the advancements in enzymatic production of MAGs and DAGs, emphasizing their sustainable and efficient nature compared to conventional chemical processes. The review discussed various pathways like esterification and glycerolysis, as well as the importance of enzyme choice, substrates, and reaction conditions in achieving high-quality products.

The review also addressed practical considerations for scaling up enzymatic processes for industrial use, such as maintaining enzyme activity and the economic implications of enzyme use. It also evaluated numerous patents in this area, reflecting a growing interest in eco-friendly enzymatic technologies.

Lead authors of the review, Jiawei Zheng and colleagues, noted the industry's increasing shift towards enzymatic processes due to their specificity, lower energy requirements, and ability to preserve sensitive components. Transitioning to enzymatic production offers safer and more sustainable emulsifiers and cooking oils, meeting consumer demands for healthier and more natural food ingredients.

The review anticipates further industry adoption and innovation in enzyme technologies but calls for continued research to overcome challenges like reaction efficiency and large-scale application. Overall, enzymatic methods have the potential to revolutionize the production of MAGs and DAGs, providing higher quality and more sustainable products for the global market.





## How combined hemp and Ayurveda innovation could hold key to capturing mass market

24-Jan-2024 - Food Navigator Asia

Hemp Horizons is a company based in India that focuses on incorporating the nutritional benefits of hemp seeds with the wellness benefits of Ayurveda to create innovative products.

They believe that by integrating Ayurvedic herbs such as Indian ginseng, ashwagandha, or turmeric into their products, they can offer consumers not only the nutritional aspects of hemp but also additional wellness benefits such as stress relief and hormonal balance.

The company currently offers a range of products including roasted hemp snacks in various flavours, as well as energy bars. They also have plans to launch energy and fitness drinks based on hemp in the future. With food regulators in markets across Asia, including India and Thailand, relaxing restrictions on hemp products, there is a growing interest in

the health and wellness benefits of hemp.

Hemp Horizons sees a strong potential for growth in the Indian market, and they also have ambitions to explore export opportunities in more mature markets such as Europe and the United States as the

industry continues to evolve. The company believes that the changing regulations and growing consumer interest in hemp products will help to dispel misconceptions about hemp as a psychotropic substance and open up new opportunities for innovation and growth in the industry.

## What are consumer attitudes to fortification? Consumers often care about taste over health

12-Dec-2023 - Food Navigator Asia

This highlights a challenge that food manufacturers face when fortifying products - finding the balance between health benefits and consumer preferences.

While fortification can improve the nutritional profile of food items, if the taste and texture are compromised, consumers may be less likely to purchase and consume them. This underscores the importance of conducting thorough research and testing to ensure that fortified products maintain a desirable taste and texture

while still providing the health benefits that consumers are looking for. Ultimately, it is crucial for food manufacturers to prioritize both health and taste in order to effectively meet consumer needs and preferences.

A study conducted in collaboration with BIC Innovation and published in the journal *Appetite* aimed to assess consumer attitudes towards fortified products. The study involved 25 participants between the ages of 22 and 76 and consisted of a two-stage process involving blind taste tests and discussions on health and taste, followed by discussions on product attributes and willingness to pay for fortified foods.

The study found that participants often detected an 'off taste' in fortified foods, with taste being a more significant factor in their willingness to purchase than health benefits. However, after being informed of the fortification, many participants saw taste as a trade-off for greater nutritional benefits and showed increased willingness to be health conscious.



Participants also viewed healthy foods as a luxury item, with fortified products being seen as too 'fancy' and potentially involving extra costs. There was also a lack of awareness about specific fortification ingredients and their health benefits, with consumers wanting more context and evidence to support nutritional claims.

The study highlighted the importance of early consumer insight work in new product innovation journeys to achieve the right balance between taste characteristics and fortification goals. Further research is needed to understand consumer acceptability of fortification at different levels and in foods not traditionally associated with fortification, particularly in relation to protein fortification for older adults.



Researchers at Queen Margaret University have developed a

lower-fat alternative to palm shortening and successfully incorporated it in bakery products

By Danielle Beurteaux  
December 13, 2023 Food Technology Magazine

Researchers at Queen Margaret University have created a palm shortening replacement called PALM-ALT, made from rapeseed oil, oat and linseed

proteins, and fibres. It has 30% less total fat and 84% less saturated fat than palm shortening.

PALM-ALT has been successfully tested in a variety of baked goods, with cakes being particularly successful due to its ability to rise higher. It has a shorter shelf life than palm oil due to its water content and requires a refrigerated supply chain. Despite these drawbacks, PALM-ALT has received positive feedback from sensory panels and could have a positive impact on the environment by reducing the use of palm oil.

They've experimented with PALM-ALT in cakes, biscuits (aka cookies), shortbread, bread, and oat cakes. They compared those products with two controls, one made with palm shortening and the other with rapeseed oil. They used a one-to-one replacement, working with industrial recipes, says Liddle, and were satisfied with PALM-ALT's performance. The rapeseed oil produced the least appealing results.

The cakes they made were particularly successful, says Liddle, because they were able to substitute 80 grams of their fat for 100grams of palm shortening. The PALM-ALT cakes also rose higher because the fat has a higher acidity. The baked goods were assessed for parameters like aroma, texture, and flavour. The panellists didn't register any sensory differences between the palm shortening and PALM-ALT samples, says Liddle.

The researchers have filed for a patent and are considering licensing PALM-ALT to manufacturers. They continue to work on improving the product, including developing a version suitable for pastries.

## Plant-based drinks face multiple barriers as suitable dairy alternatives

15-Jan-2024 - Food Navigator Asia



Plant-based beverages may be considered suitable alternatives to their dairy counterparts but must overcome challenges related to flavour, consumer health, stability and nutrient dissolution, say researchers in Singapore, the UK and China.

Plant-based beverages have gained popularity as alternatives to traditional dairy drinks due to ethical, environmental, and health concerns. They offer a variety of nutritional benefits, including proteins, dietary fibre, fats, vitamins, minerals, and bioactive molecules. However, challenges such as flavour, nutrient dissolution, stability, and consumer acceptance need to be addressed in order to improve the overall quality of plant-based drinks.

A review conducted by researchers at the National University of Singapore, King's College London, Changzhou University and Shenyang Agricultural University has found that soy-based plant drinks have the highest protein content, making them a complete protein source for adults. The amino acid profiles, anti-nutritional factors, and fibre content of plant-based drinks contribute to their nutritional value. Flavonoids, phenolic acids, lignans, and phytosterols in these drinks offer antioxidant properties and potential health benefits.

Flavour formation pathways, oxidative fat degradation, cell wall composition, and health risk factors are important considerations in the processing of plant-based beverages. Innovative extraction technologies, non-heat treatment methods, and efficient microbial control are being explored to enhance flavour, stability, and safety.

Addressing challenges related to environmental sustainability, supply chain resilience, nutritional adequacy, allergen labelling, and regulatory compliance is crucial for the sustainable development of the plant-based drink industry. Collaboration, innovation, and adherence to ethical and labour standards are essential for navigating the complexities of the market and ensuring the success of plant-based alternatives to dairy beverages.



## How confectionery embraced 'healthy indulgence'

18-Jan-2024 -

Food Navigator

Consumers are increasingly focusing on their health without compromising on taste, which is why healthy indulgence has become a serious trend. Millennials (Gen Y) and Centennials (Gen Z) are looking for foods and beverages that are tasty, good for you, and are also good for the planet.

In the confectionery space, indulgence no longer means consuming decadent or calorific treats; healthy indulgence can be found in enjoying a diverse selection of free-from chocolates or candies with fresh flavours and healthy ingredients that appeal to all the senses in a single bite.

According to the Innova Database, three in five global consumers want to try new sensory experiences such as aromas, tastes, textures, and colours. Moreover, consumers are also increasingly looking for sustainable and healthy products.

Wanlin Koh, Regional Technical Manager at ingredients group IMCD, said: "Indulgence claims around texture and flavour are gaining popularity. Indulgence has expanded beyond merely stronger flavours. Bolder and more

exciting flavour choices are now available. For example, ingredients with botanical flavours, such as spices, herbs, and seeds, are combined with conventional fruit flavours and tea elements in the beverage area. The texture is also being emphasized in premium product positioning. Brands know how words and descriptions can reinforce new textural experiences."

For example, ingredients with botanical flavours, such as spices, herbs, and seeds, are combined with conventional fruit flavours and tea elements in the beverage area. The texture is also being emphasized in premium product positioning. Brands know how words and descriptions can reinforce new textural experiences."

The chocolate, confectionery, and bakery industry has adapted to demands for more healthy sweet treats, but the cost-of-living crisis is also altering consumers' purchasing and consumption behaviours. Regulatory changes in Europe over the past few years - such as HFSS (high in fat, sugar, and sodium), Nutri-Score, Natasha's Law, acrylamide restrictions, and mandatory fortification of flour, for example - have also changed the bakery landscape.



“This all leaves a major question mark around the role of indulgence in the category as people look to save money and focus on health,” Lin Peterse, category development manager for Bakery at Tate & Lyle, told.

Consumers are undoubtedly focused on a holistic approach to health and how food can help both body and mind. “Which means there’s an opportunity for manufacturers to review some of their formulations to attract consumers and keep existing customers,” said Peterse. Consumers ranked indulgence among their top three priorities when it comes to pastries, cakes, and biscuits.



“This is something we’ve considered at Tate & Lyle, working with several manufacturers to reformulate their recipes to avoid being categorized as HFSS,” said Peterse, noting the company’s technical toolbox is a great resource to help reformulate to achieve a great taste profile with less sugar, fat or salt. “Ultimately, bakers’ product ranges must deliver on both value and health while also providing more premium and indulgent treats.” Any reformulation project is a complex balancing act to ensure the product is healthier while maintaining quality. For example, switching out a large quantity of sugar requires adding something else to preserve texture and mouthfeel.



### Innovators rethink pigment production with next-gen fermentation

17-Jan-2024 - Food Navigator

Colour is an important part of what appeals to consumers about food, making it stand out on the shelf and enhancing the perception of taste. Food colourants, therefore, have a vital job to do.

Fermentation, which can produce vegan, kosher and halal colourants that can be created with low land and water use and used across a wide range of products, is one of the key methods often used for creating colours.

Fermentation is a complex process. Unlike many other colour production methods, it relies not on insect proteins or raw materials to produce, but fungi, microorganisms, and space. Denmark-based Chromologics, for example, uses a filamentous fungi to produce its red colourant. “The first generation of Natu. Red is fermented by a non-GMO organism and production is achieved by our proprietary process design. We do submerged fermentation and have scaled our process to more than 10,000 litres. The

red molecule is made by the filamentous fungus and then secreted into the fermentation media,” Gerit Tolborg, co-founder of Chromologics, told FoodNavigator. “When the fermentation is completed, we filter away the filamentous fungus and after a number of simple downstream processing steps, we have an exquisite, deep red powder in our hands. When the fermentation is completed, we filter away the filamentous fungus and after a number of simple downstream processing steps, we have an exquisite, deep red powder in our hands.”

The process is, however, difficult to use for other colours using the same fungi – it must be adapted. “The production of secondary metabolites in filamentous fungi is very much dependent on the growth conditions. Colours are usually secondary metabolites, because they are not essential for growth and survival of the fungus but bring the microorganism certain advantages. Thus, while our filamentous fungus naturally produces a variety of colours (yellow, orange, red), it is by process design that we can control the fungus in producing one molecule exclusively.” Thus, for each colour produced by Chromologics, there is a different fermentation process, customised to make production more efficient.



US-based Argentinean company Michroma uses a similar method. "Michroma's novel approach centres on creating fungal bio-factories to produce small molecules, like colours, more efficiently," Ricky Cassini, co-founder and CEO at Michroma, told this publication. "We are leveraging the power and versatility of filamentous fungi with our synbio platform. By combining a unique fungal chassis strain with precision fermentation, we are capable of producing high-value complex molecules with high yields previously unseen in the biotech industry."

Michroma's colouring, for example, is in many senses the functional equivalent of cochineal, a product derived from insects. "Cochineal dye is produced by harvesting a lot of insects from infected cactus plants, smashing them, and then using aluminium stabilization. Like any agriculture-derived product cochineal dye producers depend on climate conditions and use decent amounts of water and land," Cassini told us. After they are produced, colours can be used across a wide spectrum of foods. For example, according to Chromologics' Tolborg, the company's red can be used in products including meat and meat alternatives, dairy and dairy alternatives, baking and confectionery.

"In these categories we see the best product market fit

with regard to our product performance (pH- and temperature stability, colour hue, absence of taste and odour) and the pain point of the respective category," she told FoodNavigator. The response from industry to the colour, according to Tolborg, has been 'overwhelmingly positive.'

"Plant-based food manufacturers, in search of vegan-friendly and stable red colours, have also shown significant interest."

### How will food additives' reputation fare in 2024?

15-Jan-2024 - Food Navigator

Off the back of shifting political landscapes, evolving biotech-led categories and regulatory changes in 2023, we look at how these influence food additives in 2024 and what further changes we can expect to see.

Additives are used for various purposes in the preparation of food, including restoration, preservation, prolonging shelf life, and quality improvement. They comprise colours, preservatives, antioxidants, and flour treatment agents.

Amid new guidance and laws affecting additives, on 16th November 2023, the World Health Organization (WHO) published a factsheet on food additives, bringing together information on

what they are, how they are assessed for safety and how consumers can learn about the additives in their food products.

The Scientific Committee on Food (SCF) and/or the European Food Safety Authority (EFSA) assess additives to determine their safety and place them on the EU list once approved. For products traded internationally, the Joint FAO/WHO Expert Committee on Food Additives (JECFA) is responsible for assessing the safety of food additives. The EC's stance on food additives is now in its sixth year. The Standing Committee on Plants, Animals, Food and Feed (PAFF), which brings representatives of Member States and the Commission to discuss issues related to food safety, issued its position on food additives on 17th September 2018. The opinion on the use of plant extracts rich in constituents capable of performing a technological function, put forward: "Such use of extracts that delivers a technological function (e.g. preservative, antioxidant, stabiliser (colour stabiliser) etc.) in foods to which they are added is deemed a deliberate use as a food additive.







Consequently, such use is deemed to meet the definition of a food additive, and so it shall comply with the conditions set out in the food additive legislation (including relevant specifications) and be labelled in accordance with the appropriate provisions for labelling of food additives," the opinion continued. The PAFF opinion intends to assist Member States authorities with applying the European Union (EU) rules on food additives, most notably Regulation (EC) No 1333/2008 of the European Parliament and of the Council of 16th December 2008.

EU legislation defines additives as "any substance not normally consumed as a food in itself and not normally used as a characteristic ingredient of food, whether or not it has nutritive value". The EU also has legislation governing labelling food additives based on predefined E-numbers. "The enforcement of this EU legislation is the responsibility of the Member States and not of the Commission," highlighted De Keersmaecker. "It is, therefore, for the Member States' authorities, and not for the Commission, to take a position on the legal status of individual

products, on a case-by-case basis," De Keersmaecker added.

On 6th October 2023, the European Commission (EC) published its Commission Regulation (EU) 2023/2108, setting new lowered limits for nitrite and nitrate food additives. Implemented as a step towards Europe's Beating Cancer Plan, Safe Food Advocacy Europe (SAFE) supported the move: "SAFE has always called for stricter nitrate and nitrite limits in food". The regulatory update also responded to the EU's diverse range of products and manufacturing conditions.

Upcoming stevia labelling changes in November 2024 will shape how brands formulate sweeteners and market them in their products. Manufacturers will need to ensure the correct labels are on stevia-product packaging, and the contents will vary depending on the ingredient's source, adding a layer of complexity to the food supply chain. If guidance recommends consumers limit their intake of dietary components, such as sugar, it may suggest that alternatives, like sweeteners, provide a better replacement. However, this is not necessarily the case. WHO,

for example, issued a recommendation in May 2023 against using non-sugar sweeteners based on evidence that they don't appear to benefit long-term weight loss or maintenance and may increase noncommunicable disease risk. As the high fat, salt or sugar (HFSS) regulation settles in, it may encourage producers to look at how food additives can be used in products to replace these components but create similar organoleptic profiles to mimic taste, texture and mouthfeel.

Natural preservatives, including phages and their endolysins, bacteriocins, and plant-derived substances, can offer a viable alternative to synthetic chemicals in preserving meat, an October 2023 study by researchers from Zhejiang A&F University and Zhejiang University found. If research promotes the positive possibilities of natural preservatives, it may create opportunities for the industry to explore what natural means in the context of meat and question where it leaves synthetic food additives.

# REGULATORY NEWS

## Nutri-Score originator supports EU-wide adoption of the nutritional ranking system

24 Jan 2024 Nutrition Insight

The Belgian ongoing Presidency of the EU Council is placing the debate on the EU-wide adoption of the Nutri-Score back on the table.

The five-colour nutritional ranking system was developed by the French public health agency and first adopted by the country's government in 2017. Nutrition Insight discusses the benefits and concerns of a region wide use of the label with Serge Hercberg, professor of nutrition at the faculty of medicine at Sorbonne Paris North University, whose work forms the basis of the Nutri-Score.

"Science should guide policy decision-making in public health, so the choice of the single harmonized front-of-pack nutrition label for Europe must meet this

requirement and not the interests of economic operators or states that defend them. It is clear that there are strong arguments in favour of choosing the Nutri-Score," Hercberg asserts. "This is an excellent initiative essential to relaunch the process of adopting a unique and mandatory nutritional label for Europe, which is currently on standby at the European level," he comments.

The EU Commission announced the adoption of mandatory nutritional labelling of food across the whole bloc by the end of 2022 in its flagship food policy strategy, Farm to Fork. Still, the promise is yet to come to fruition. "This delay is regrettable because, in Europe, we have to face major public health issues in which nutritional factors are involved: obesity, cancer, cardiovascular disease and diabetes, among others. Nutri-Score is an effective tool to help consumers adopt healthier eating

habits to reduce the risk of chronic diseases," Hercberg states.

"Unfortunately, so far, due to a specific European regulation on the provision of food information to consumers voted a few years ago – and drafted in a context of very strong pressures from powerful lobbies – member states cannot make a front-of-pack nutrition label such as Nutri-Score compulsory in their country," he explains. "However, to be effective, Nutri-Score must be displayed on all food packaging, so the European Commission (EC) has to change its current regulation related to consumer information and make it mandatory."

Addressing the opposition's concerns regarding the compatibility of Nutri-Score with different national dietary guidelines, Hercberg argues: "Since 2022, the International Scientific Committee composed of independent European experts has been making

recommendations on how to improve the system. The revision of the algorithm underlying Nutri-Score permits improvement of certain identified limits of the Nutri-Score and reaches a better alignment of the Nutri-Score with public health nutritional recommendations of European countries."

Hercberg outlines four specific benefits of the adoption of the Nutri-Score system across all 27 EU countries – scientific studies conducted across different nations reveal it helps consumers make healthier choices, the simple color-coded system is comprehensible for people of various backgrounds, there appears to be public support for the adoption and seven European countries have already adopted it.

"Numerous scientific studies performed over many years in some 20 countries validate the algorithm underlying the Nutri-Score calculation – including cohort studies involving more than 500,000 subjects with long-term follow-up – and its effectiveness to help consumers make healthier food choices. These have included studies in virtual supermarkets, experimental stores and real supermarkets. More than 130 studies have been published since 2014 in

international peer-reviewed journals demonstrating its effectiveness and superiority over other labels, particularly in disadvantaged populations," he further states, alluding to the argument that part of the system's appeal is that it is easy to comprehend by various populations.

"The consumers including those with lower income, appear to prefer simple, colourful and evaluative summary front-of-pack labels, which are more easily understood, than more complex, non-evaluative, monochrome labels," he adds. A public consultation launched by the EC in 2021 suggests overall support for the adoption among consumer associations, citizens, NGOs, research and educational structures and public authorities.

By Milana Nikolova

**Safety first: FSSAI imparts training to food handlers of government canteens**

*FSSAI has also imparted training to food handlers at the Department of Personnel and Training, North Block."*

Kavita Bajeli Datt  
17 Feb 2024, The New Indian Express

**The training of food handlers at various state Bhawans and government office canteens is a crucial step towards ensuring food safety and hygiene standards are upheld across the country.**

By imparting knowledge on food safety rules and regulations, personal hygiene, allergen management, and other key aspects of food handling, FSSAI is equipping food handlers with the necessary skills to maintain a safe and healthy food environment for consumers. The certification provided to participants upon completion of the training will serve as a testament to their commitment to upholding food safety standards in their respective establishments.





The exercise to train food handlers has been undertaken as part of FSSAI's endeavour to enhance the food safety ecosystem nationwide through its flagship programme of Food Safety Training and Certification (FoSTaC), designed to impart training to food handlers involved in the food business.

In the four-hour-long training session, the food handlers were taught food safety rules and regulations, keeping personal hygiene, allergen management, food operation and control, documentation and records, labelling, training methodologies and emerging trends in the food industry.

The initiative to train 25 lakh food business operators in the next three years reflects FSSAI's dedication to promoting a culture of continuous learning and improvement within the food industry. By ensuring that food handlers are well-informed and equipped with the necessary skills to handle food safely, FSSAI is taking a proactive approach towards enhancing the overall food safety ecosystem in the country. This initiative aligns with

the government's commitment to ensuring the well-being of its

citizens by fostering a safer and healthier food environment.

The objective is to instil a culture of continuous learning and improvement within the food sector. Participants who complete the training will be conferred with the Food Safety Supervisor certificate, recognised across India. In 2023-24, 3,58,224 staff were trained under the FoSTaC programme.

### Food Safety and Standards Authority of India (FSSAI) reinstates Guidelines for Nutritional Supplements and specialized Food Items

22. FEBRUARY 2024

By Julian Busch, Founder & MD of MPR International GmbH for MPR India Certification

In 2022, the Food Safety and Standards Authority of India (FSSAI) introduced updated regulations named Draft FSS Regulations (Health Supplements,

Nutraceuticals, Food for Special Dietary Use, Food for Special Medical Purpose, Prebiotic, and Probiotic Food), superseding the 2016 guidelines.

These regulations make FSSAI Registration for the mentioned product categories mandatory, in order for them to be approved for import and distribution in India.

The regulations initially took effect on March 29, 2022, with subsequent amendments on May 10, 2022, to incorporate additional additives and enzymes/proteins for health supplements. Although initially enforced on October 1, 2022, and revisited on April 1, 2023, the full official adoption of these rules has been delayed. Hence, an extension has been granted for three more months from October 1, 2023, as per the directive dated April 11, 2023, under the empowerment of the Food Safety and Standards Act of 2006.



## India's food safety regulator has changed approach, set global standards

By Sunil D'Souza, Managing Director & CEO, Tata Consumer Products in Business Standard  
Feb 16 2024

In less than a decade, India's food and agriculture sector has blossomed in a way that can be termed nothing less than a boom. From agricultural and dairy production to the food processing industry, the numbers reveal the growth story.

The country's total food grain production is estimated at a record 329.687 million tonne for 2022-23 -higher by 30.869 million tonnes than the previous five years' (2017-18 to 2021-22) average production of food grains. During 2021-22, India produced 107.24 million tonne of fruits and 204.84 million tonnes of vegetables. India is ranked first in milk production, contributing 24.64 per cent of global production. From 146.31 million tonne during 2014-15 to 230.58 million tonnes in 2022-23, milk production is growing at a compound annual growth rate of 5.85 per cent. The gross value added of the food processing sector has increased from Rs 1.34 trillion in 2014-15 to Rs2.08 trillion in 2021-22, with the



industry attracting \$6.185 billion foreign direct investment equity inflow in April 2014-March 2023. The share of processed foods in agriculture exports has increased from 13.7 per cent in 2014-15 to 25.6 per cent in 2022-23. Food processing is one of the largest providers of employment in the organised manufacturing sector with 12.22 per cent employment in the total registered/organised sector.

The Food Safety and Standards Authority of India (FSSAI) has played a pivotal role in ensuring the safety and quality of food products in the country while also fostering growth and innovation in the food industry. Through its robust regulatory frameworks, digital platforms, and collaborative initiatives, FSSAI has been successful in creating a conducive environment for food businesses to thrive. The recent focus on promoting millets and fortification of foods, as well as adapting to evolving consumer preferences, demonstrates FSSAI's commitment to ensuring a safe,

nutritious, and sustainable food supply for the future.

As we move forward, it is important for both FSSAI and industry stakeholders to continue working together to promote food safety awareness, adopt best practices, and support regulatory efforts to further enhance the food ecosystem in India. By building on the successes of the past decade and embracing new opportunities, we can ensure that the food and agricultural sector in India continues to flourish, benefitting not only consumers but also small farmers, entrepreneurs, and the economy as a whole.

## Govt panel to review if nutraceuticals should be brought under CDSCO

Economic Times - Industry Feb 18, 2024 PTI

Overall, the government is looking to address regulatory challenges and promote consumer safety in the nutraceutical industry





by potentially bringing these products under the regulation of the apex drug regulator CDSCO instead of the food regulator FSSAI.

The committee has as its members Secretary, Ministry of Ayush, Secretary, Ministry of Food Processing Industries, Secretary, Department of Pharmaceuticals, Chief Executive Officer (CEO), FSSAI, Drugs Controller General of India, Director General, Indian Council of Medical Research and Director General of Health Services (DGHS) as members.

The nutraceutical market in India is estimated to reach USD 18 billion by the end of 2025 as compared to USD 4 billion in 2020, according to industry data. During the meeting some officials noted that many health supplements like probiotics, vitamins, minerals and botanicals also have therapeutic usage and due to unclear demarcation, many companies are shifting from CDSCO to FSSAI for approval of ingredients which are akin to drugs such as melatonin and zinc

carnosine. Some officials said several supplements are marketed with disease management/disease risk reduction claims considering that the same ingredients are permitted in both drugs and nutra regulations, the sources stated.

"Besides, there is no mandatory medical supervision for products covered under nutra regulations as a result people might consume it for longer duration and/or in higher doses which might prove harmful," the sources said. However, concerns have been raised about the overlap between nutraceuticals and pharmaceuticals, as well as the potential for adverse effects from unsupervised usage of health supplements. The committee will examine various aspects of the regulation of nutraceuticals, including the feasibility of price control, GMP provisions, and possible alignment with drug manufacturing standards. Overall, the government's focus is on ensuring consumer safety, addressing regulatory challenges, and promoting responsible usage of nutraceuticals to protect public health and well-being.

## India to Set Regulatory Framework to Move Forward Cultivated Meat & Seafood

March 8, 2024 Cultivated X Politics & Law

The cultivated meat and seafood industry in India is still in its early stages but has the potential to benefit from the country's thriving pharmaceutical sector.

The country is poised to become a supplier of cell culture media ingredients for cultivated meat production, such as growth factors, recombinant proteins, fats, and edible scaffolds. Startups in India are providing ingredients and solutions for the cell agriculture and pharmaceutical sectors.

The Good Food Institute India (GFI India) has supported startups in the cultivated meat and seafood industry. The GFI India also collaborates with governmental institutions and provides regulatory advice to help establish a clear regulatory path to market for cultivated meat and seafood products.



Other countries, such as Singapore, the USA, Israel, Australia, New Zealand, South Korea, Brazil, and Japan, have already approved or are in the process of regulating cultivated meat products. Cultivated meat and seafood have the potential to diversify protein production with more sustainable methods compared to traditional animal agriculture and fisheries.



In India, meat consumption is prevalent, with the majority of the population consuming fish, chicken, and other types of meat. This consumption leads to significant greenhouse gas emissions, including carbon dioxide, methane, and nitrous oxide. Cultivated meat production can help lower environmental impact, including reducing global warming and land and water use. A report in 2020 found that almost half of Indian consumers would be willing to purchase cultivated meat, showing a significant interest in alternative protein sources in the country.

## Warning Labels for Informed Choices Over Food

Mar 11, 2024, Asian Age

Consumers face challenges in making informed choices due to the abundance of options, complex product information, and aggressive marketing tactics.

This is exacerbated by a lack of transparency, inadequate product information, ambiguous labelling, and deceptive advertising. The consequences of this lack of transparency extend to food products, contributing to the rise of diet-related diseases and other public health issues.

The prevalence of non-communicable diseases (NCD) in India has been on the rise, with cardiovascular diseases (CVDs) comprising a significant portion. This is linked to factors such as inadequate regulations in the food sector and the widespread availability of unhealthy foods without adequate warnings for consumers. Large food industries often employ double standards in the Global South, making it difficult for regulators and policymakers to introduce and implement much-



needed regulations.

There is a growing call for prominent warnings on food packages to alert consumers about unhealthy and deceptive food products. Regulators and policymakers need to prioritize national health over short-term economic interests and acknowledge the voices of public health experts and consumer groups to address the rise in NCDs.

Manufacturers also have a moral and social responsibility to provide healthier food choices and transparent information about negative ingredients through warning labels. Embracing a shift towards healthier products not only aligns with ethical considerations but also presents opportunities for lucrative markets in the realm of wholesome and nutritious foods.

Promoting consumer education, raising awareness about food labelling, nutritional information, and consumer rights, and advocating for



foods solely because of their processing could hinder the acceptance of processing as a necessary aspect of developing nutritious, affordable, sustainable, and safe foods.

meats and milks are considered highly processed, they can still have beneficial nutritional profiles compared to animal products. For example, research he conducted found that soy-based burgers had similar or lower energy density, similar or higher protein content, higher dietary fibre content, and lower fat content compared to burgers made with lean beef. Similarly, soymilk had a lower energy density and contained fibre, which cow milk lacked.

He emphasizes the need for more research into how processed foods affect health and eating patterns, as well as a more nuanced discussion about the nutritional profiles and potential health impacts of individual processed products. Messina suggests that not all ultra-processed foods have the same effect on health, and it is important to consider the specific nutritional content of each product rather than categorizing them all under a single negative label.

consumer rights are essential steps towards creating a transparent and consumer-centric global marketplace. Through collective action, stakeholders can work towards empowering, informing, and protecting consumers for a healthier and more sustainable future.

### Not all ultra-processed foods impact health the same way

04-Jan-2024 - Food Navigator USA

In summary, Mark Messina, the director of nutrition science and research for the Soy Nutrition Institute Global, argues that demonizing ultra-processed



He highlights that the NOVA classification system, which categorizes foods based on their processing level, paints all ultra-processed foods with the same broad brush, making it challenging to understand their nutritional value and health impact.

Messina points out that while many plant-based

