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# FOOD, NUTRITION & SAFETY MAGAZINE

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# BRING BACK GOOD OLD DAYS

When I was studying in primary school (meaning very long time ago), during the break, the school used to provide us milk and biscuits. That was one of our high points of school day. No student would be late for that and we used to line up very obediently and orderly. There was no need for our teachers to scold us. We happily waited for our turn to get the milk bottle and a small pack of glucose biscuit.

Each boy and girl happily took the milk and biscuit and go and eat and drink and then deposit the empty glass milk bottle into the metal crate without breaking and drop the wrapper into waste bin and would be smiling our way back to the next class. Our mothers did not have to worry about giving us a lunch box and money for canteen. The milk and biscuits would keep us satisfied till we went home after school.

I am wondering if the kids are happy with the midday meals

that they provide now. I don't know if it is enough or nutritious. I am sure the health professionals ensured that it is nutritious. However, when I saw the new guidelines, I felt that we should emphasise more on milk and fruits & vegetables as the learned scholars advised. The cereal grains and such things are not novelty to these kids but if they were given such above things as milk, fruits and vegetables as recommended, which they don't get enough at home and would do them a lot of good with high quality protein, dietary fibre and micronutrients.

Milk prices have gone up so much and fruits and vegetables have become rare in these kids' homes. These are the kids from not-so-well-to-do families who are given the midday meals. I am not saying that we should stop the current food, but we should give in addition things that normally their families cannot afford. It does not require a financial expert to say that what is recommended for the diet of children are foods that are too expensive and affordable. Such expensive solutions that cannot be

afforded are no solutions.

It is the government's responsibility to take care of these young students who are willing to study so in future can be leaders in our country and show us the better way. We must ensure that their mental and physical development is not hampered by the lack of healthy and nutritious foods which they cannot afford but need.

Even the British Nutrition Foundation (1) stated recently that price is the barrier for healthy food choices for children. Having known fully well that the children from weaker section of our society need greater attention, we must try to suggest solutions that are achievable. Here top health professionals can strongly recommend to the government that development is very important for the nation, we need equally urgently to take care of our children feeding them with nutritious foods.

If their parents cannot afford these then authorities must make provisions for such expenditure so children will grow physically and mentally and take care of this nation when they become strong leaders tomorrow.

**Prof Jagadish Pai, Editor,  
PFNDAI**

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1. <https://www.foodingredientsfirst.com/news/price-problems-british-nutrition-foundation-reveals-barriers-to-healthy-food-choices.html>

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# FOOD FOR THOUGHT OR THOUGHT FOR FOOD



By  
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Former Director, National  
Institute of Nutrition (ICMR) Hyderabad,  
Chairman- Scientific Advisory Committee  
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The theme for nutrition month or Poshan Maah 2024 is Nutritious Diets for All with focus themes relating to various aspects of nutrition , growth and development , education, monitoring and governance.. This theme emphasises that nutritious diets are not confined to any single phase of life or age group but starts from pre conception to prepare the mother to be adequately nourished even before she conceives. This is the critical phase when within the first week of conception itself the epigenetic programming happens.

Quite a few epigenetic changes define the future of the baby and its entire life course. Risk of diseases in future life are dependent on such programming. Organogenesis, body composition metabolic programming all depends on mother's nutritional status in those first few days after conception.

Mother's nutrition from then on decides the growth and development of the baby both body and mind. These depend on the intrauterine growth

phase when energy, protein and micronutrients supply has to be adequate and uninterrupted. Intrauterine growth retardation and small for gestational age fetuses and low birth weight babies are all consequences of inadequate and improper nutrition of the mother during the 3 trimesters of pregnancy.

The Post Natal or after birth period centres around good lactation and the next 6 months of growth and development and immunity of the baby are dependent on breastfeeding only. Mother's nutrition again is very critical since she transfers all the nutrients to the baby during those 6 months and even beyond. After 6 months the baby needs the right kind of complementary feeding. This is the stage when many children in our country falter in their growth and move from being adequately nourished to under nutrition. This is also the phase when apart from the nutritious qualities of food, the child also develops taste and taste thresholds get established. By minimising the use of sugars and other sweetening substances as well as salt the child's tongue gets sensitised to get adapted to lower levels of sugar and salt.

Pre-school and school age

children need physical and cognitive development. Obviously it is nutritious food again which determines this development apart from physical activity and good scholastic training. Early adulthood and adolescence are the phases with lots of temptations to move away from nutritious food options. There are several food options now and it all depends upon the availability and affordability and if these are not an issue then self-control and proper information is needed for the young people to choose the right kind of healthy nutritious foods.

The late years of one's life is almost similar to infancy. This is the age when the past illnesses start expressing as chronic diseases. The nutritional needs are highly individualised and with limitations like low or high appetite, behavioural changes, availability and accessibility issues etc. These factors complicate the access to the right kind of nutritious food for the elderly.

While traditionally we considered food as medicine or food as God or food as life, the nutrition knowledge was always supreme. It is for us to provide such knowledge guidance to everyone across all age groups. Industry has a major role to play and they should also provide such guidance through good nutritious and healthful products, honest advertising and the right kind of information on the label without making unrealistic and unsubstantiated claims. We should always remember that natural sources of food are always to be preferred unless it is not possible to do so and only then go for other alternatives.



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# CONSUMERS ARE BETTER PROTECTED UNDER FSSAI



AUTHOR

Dr Joseph I Lewis,  
Chairman, Regulatory Affairs,  
PFNDAI

Adulteration is a legal term for a product that fails to meet the standard. Foods processed in unhygienic conditions were specified as 'free from filth, dead insects, and rodent hair,' which upon failing visual testing were declared adulterated. Good hygiene practice was not the focus. The term adulteration changed to unsafe food in FSSA( 2006), signalling a paradigm shift in legal frameworks.

PFA inspects and tests for unsafe foods in the market, FSSA does not want them there. Previously, merely citing noncompliance to standards was sufficient and everyone moved on. Now, all parties must determine how the failure evaded detection before reaching the market. The law redefines consumer protection. A proactive approach replaces the obsolete until-it-happens attitude.

Food is considered unsafe if it is injurious to health or unfit for human consumption. Foods injurious to health require identifying the hazard -an agent or a condition -at any stage in the food chain that renders it unsafe. A food 'opined unsafe' on a test report is no longer a valid

conclusion. Testing is a measurement, to be unsafe requires a finding based on risk assessment. Food unfit for human consumption is usually a visual, aesthetic, or sensory observation related to microbial spoilage, mould growth, foul odours, or decayed and diseased sources. Note the shift from unsafe products to the safety of the food chain.

Globally, modern food safety control systems operate on safeguarding supply chains. Parliament (2006) aligned India's food safety system by integrating agricultural production, manufacturing, consumption and nutrition described as 'field or farm to table.' A direction asking FDAs to (a) regularly undertake enforcement sampling of food products across the country to ensure the availability of safe and wholesome food and (b) if found unsafe, to prohibit the sale or initiate a recall to protect consumers indicates PFA is still operating. There is something strikingly illogical about searching markets for unknown unsafe foods made available for consumption and claiming to protect consumers.

Food business operators hold legal responsibility for placing safe food

on the market as they know best how to secure the safety of supply chains at each stage under their control. For a temporary lapse (e.g., microbiological contamination, unlabelled allergen), the business operator initiates a recall and thereafter traces and rectifies the fault point in the chain. FBO responsibilities (liabilities) are given in Chapter VI. The Authority and FDAs under Chapter VII verify safety systems provided by FBOs during licensing and subsequently, through inspections, monitor their efficacy at all stages of business.

While food safety is everyone's business, the Authority, FDA, and FBOs must pursue their respective tasks - avoiding duplication - to ensure the capability of supply chains. FDAs exercise risk management options to correct, improve or stop the functioning of unsafe activities in the chain through improvement notices, suspension or cancellation of licenses, and prohibitions.

The duty of the Authority is primarily to provide messages on population health and nutritional risks to the Government and policymakers. To fulfil this obligation, it must provide real-time trends by establishing a database (searching, collecting, collating, summarising) related to food consumption, exposure to substances (additives, contaminants, and residues), and nutrients (fat, trans fat, salt, sugar). How else would population safety and health status be known and whether objectives of the Act are being met and targets achieved?

In repealing the PFA, Parliament essentially replaced the fragmented approach of too many administrations that clutter the path to achieving public health goals. PFA may have served as an interim measure, but it can no longer masquerade as the food safety system under the Act.

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# TEXTURISED VEGETABLE PROTEIN: VERSATILE PROTEIN INGREDIENT



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Texturised Vegetable Protein (TVP) also known as Textured Soy Protein (TSP) is obtained from defatted soy flour, a by-product after extracting soy oil. TVP is often used as a meat extender or meat analogue which contains protein same as in defatted soy flour.

It was first developed by Archer Daniels Midland (ADM) in 1960. They developed TVP by extruder in the shape of rods or

tubes. By 1968 it was widely used in a variety of food products. Its consumption tremendously increased in the US after 1971 when it was approved for use in school feeding programs. TVP can also be produced by other pulse seeds like lentils, faba beans, or peanuts after the extraction of oil (1). Nutritionally, it is a rich source of proteins and fiber and offers so many health benefits which are obtained by consumption of proteins and fibers. Its unique texture makes it a vital ingredient in many vegetarian products such as sauces, plant-based chilly mixes, and veggie burgers as a meat substitute. Before use, it should be rehydrated to attain a chewy texture (2). With the recent trend in

rising veganism and environmental concerns for animal-based foods, this will find more applications in food products.

With rising demands for this ingredient, food engineers and developers have successfully developed products and technology with wide applications. The “textured vegetable food proteins” are now considered as a broader range of products that are made from defatted soy flours, concentrates, isolates as well as other cereal and legume proteins. There are several types of textured vegetable food proteins available in the market that can be used with meat or “as is” (3).

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Carbohydrate (g)	25.5	-
Total Sugars (g)	9.9	-
Added Sugars (g)	0	-
Dietary Fiber (g)	6.2	0
Total Fat (g)	9.8	14.6
Saturated Fat (g)	3.0	13.8
Trans Fat (g)	0	0
Cholesterol (mg)	3.7	0
Sodium (mg)	0.2	0

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- Fibrous vegetable proteins
- High Moisture Meat analogue (HMMA)
- Low Moisture Meat analogue (LMMA)
- Textured Meat Protein (TMP)

They are all designed for the purpose and the selection of ingredients is also specific based on the applications. This is better explained in the following discussion.

**High Protein snacks:** This type of textured protein is designed to be used in dry form which can be flavoured externally. They should be crunchy and crispy and not hard and resistant to breakage in processing. Generally, Soy concentrates containing 70% protein with low solubility should be used. A higher percentage of proteins will affect the texture. They are available in various shapes.

**Textured Meat Extender (Chunk style TVP):** They are made from extrusion of soy flour, and concentrates and form a large portion of texturized Meat Protein. They are mixed with meat

for further processing. They imitate characteristics of meat like a chewy texture when hydrated with water. Originally in the dry form with 6 - 10 % moisture, they are available in small granules to large steaks that are 12mm thick, and 120 mm long. These products may be coloured to mimic a particular type of meat. Other raw materials can be added to add nutrition, functionality, colour, or reduce allergenicity. Wheat gluten with 80% protein can be used. Functional properties such as water and oil absorption, and meat-like texture become very important.

**Structured meat analogue (SMA):** This type of extruded product is very similar to meat in appearance, texture, and mouthfeel when cooked properly. The density of SMA is much higher than that of chunk-type products. Generally, they have 8 - 10 % moisture and they usually absorb three times the water of their weight. To convert into a ready-to-eat meat alternative requires the addition of sufficient water, spices, and 15 - 20 minutes of boiling. A special extruder configuration and die design are required to produce this kind of product.

**Fibrous soy protein:** These products are manufactured to imitate whole muscle or restructured meat products such as deli meats, chicken breasts, and fish fillets. They are manufactured using a cooking extruder with specialised die technology to form a continuous fibrous structure. They are made using high solubility soy isolates/concentrates, and corn or wheat starch. To make a final product, they must be hydrated in water and usually absorb water three times their weight.

**High Moisture Meat Analogues (HMMA):** This is a relatively newly invented product in Europe and then brought into the US. It is designed to mimic the properties, texture, nutrition profile, flavour, and appearance of whole-muscle meat, which is especially with low-fat content. It has densely layered fibrous structures similar to whole muscle products. It typically contains 60 - 70% moisture, 2 - 5% oil, and 10 - 15% protein. It is available in chunks to imitate cubed meat or shreds to imitate pulled meat.





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vegetable oil as raw materials.

### Textured Meat protein (TMP): (4)

This is processed in a twin-screw extruder by using soy flour, and meat together to mimic the whole

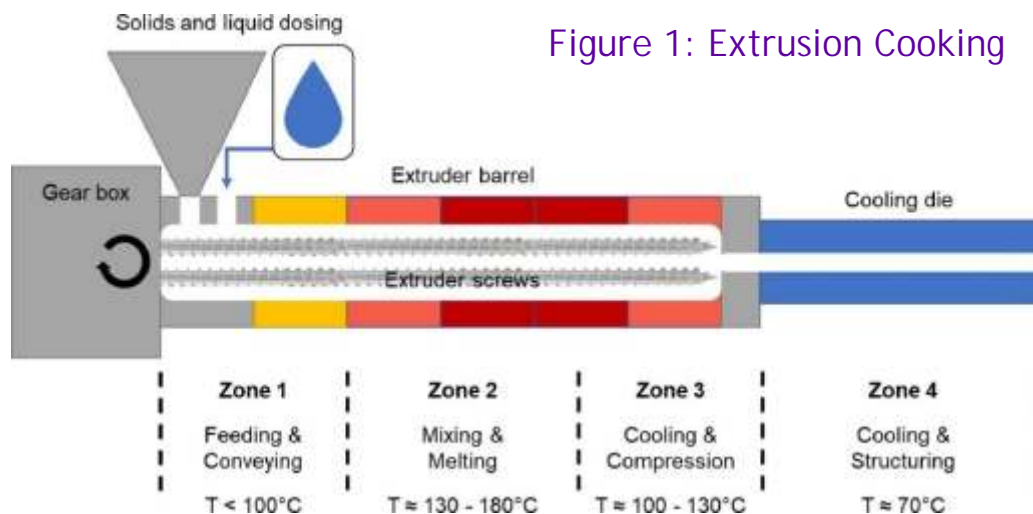
muscle's texture and composition. Generally, low-end fresh meat is used. Subsequently, the product is dried, frozen, or retort-packed. This ingredient finds major application in canned pet foods. Vegetable proteins are available in powder form. The texturisation process is required to give the vegetable protein a meat-like texture to mimic its unique physical and sensory qualities (bite and mouthfeel with a fibrous structure). As seen earlier, TVP can be classified into low or high moisture.

HMMA is produced using a twin screw extruder where a protein mass with 60 -70% moisture is mixed and heated. The hot mass is pumped through the extruder through a long cooling die where the texturization happens. The product is cooled below 100 degrees C before it exits the die so that there is no expansion and a dense product is obtained. This being high in moisture, it needs to be frozen, aseptically, or chemically preserved.

**Low Moisture Meat Analogues (LMMA):** LMMA is prepared using a special extruder and dies to mimic its structure to that of whole muscle meat texture and composition. It is cut into different shapes and sizes by an extruder screw and dried for shelf stability and ease of handling. After hydration, the composition is approximately 60 - 70% moisture, 2 - 5% oil, and 10 - 15% protein. A typical formulation of LMMA will have high-solubility Soy concentrate/isolate, wheat gluten, mechanically expelled soy flour, and

continuous mixing, kneading, and shaping process that relies on thermo-mechanical stressing of materials. Moistened, expandable starchy and proteinaceous materials are plasticized and pushed through a die by the combination of heat, pressure, and shear to get TVP. Low moisture extrusion cooking (LMEC) has been in practice from very early times (before the 1940s), whereas High Moisture Extrusion Cooking (HMEC) is the later development. Both processes vary in terms of water (LMEC 20 - 40%, HMEC >40%) used, the equipment configuration as well as temperature profile within the extruder. It is possible to produce both low and high-moisture TVPs by the Extruder process. Generally, the protein undergoes four conformational changes: 1) Unfolding of molecular chains, 2) association, 3) aggregation, and 4) cross-linking in conjunction with degradation and oxidation processes.

The conventional method of manufacturing TVP has been Extrusion cooking (Fig. 1). Extrusion cooking is a





Other technologies are also gaining popularity in producing high-moisture TVPs. One such process is the “Shear Cell Technology” (Fig. 2). This is also based on Thermo-Mechanical stress. This is a three-step process viz. Mixing and Hydration, Thermo-mechanical processing, and Cooling. This is typically a batch process. Mixing and hydration happen outside the device. The structure formation is achieved by temperable shear cells in cone-cone geometry. A constant shear rate is applied for 15 minutes while heating, which is followed by stationary cooling.

The closed, pressurised system allows operations above 100 degrees C without water evaporation. Water content is 50 - 70% and temperature ranges from 95 - 140 degrees C. Process temperature, time, and ingredients are the variables. Compared to HMEC, shear flow technology enables well-defined shear flow and requires lesser mechanical energy inputs. A larger, thicker, fibrous meat-like mass is produced in this process.

Another recently tried process that produces thin fibers is “Electrospinning” (Fig. 3). These fibers are then assembled with other structural elements to make

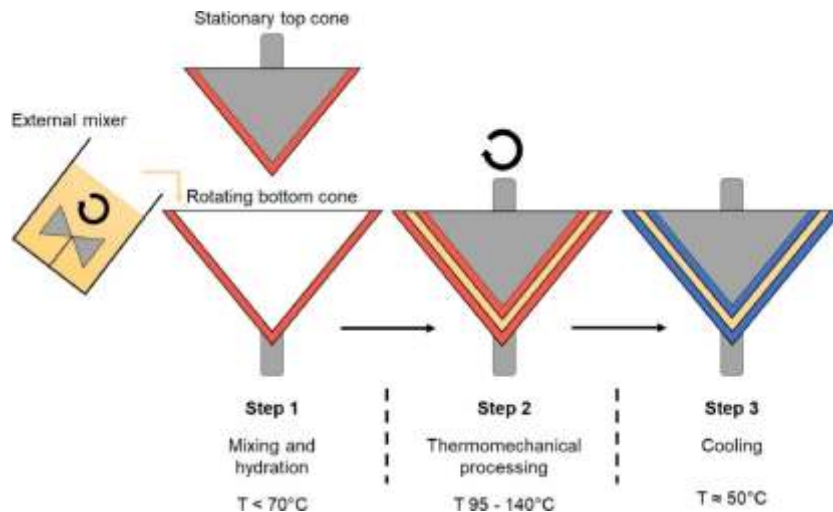


Figure 2: Shear Cell Technology

the meat-like product. This technology has been used to produce nanofibers and is cost-effective. The biopolymer solution is passed through a cannula or spinneret with an electric potential relative to a ground electrode (collector) causing surface instabilities and rapid fiber.

The process depends upon many components such as polymer properties, solvent properties, as well as process conditions like temperature and relative humidity. The requirement is highly concentrated polymers with high concentrations. Plant proteins are generally globular and form insoluble aggregates when denatured. Numerous animal proteins like whey, collagen, and

gelatine have been successfully processed into fibers by electrospinning. When it comes to pure plant proteins, only “zein” was successfully processed.

However, plant proteins with other carriers like maltodextrin which are spinnable could be electrospun because of the covalent attachment of maltodextrin carbonyl groups with the free amino acids.

There are some concerns about the use of TVPs because of the sources of raw materials used to produce them. Soy, wheat, and peas are prominent sources. Recent additions are Faba beans, rapeseed and canola proteins.

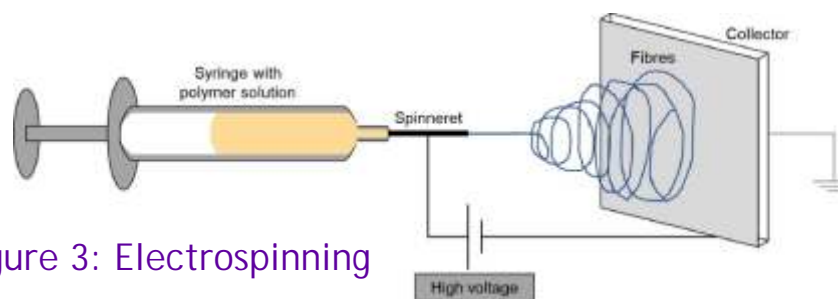


Figure 3: Electrospinning



TVP-based products. Vegetarians will not mind some animal-based ingredients like egg, whey, and casein.

Soy proteins can cause allergies, and proteins like gluten can cause adverse reactions like celiac disease, and gluten allergy. The issue of GM crops of Soy is also another concern. Therefore, proper labeling is required. Consumers are suggested to be watchful of the ingredients and warnings.

The market for TVP is expanding for several reasons, which include concerns for health, the environment, and ethical issues. Vegans, Vegetarians, and Flexitarians will go for

Flexitarians can reduce the animal foods in their diets by use of such products and this market has potential to grow.

The global TVP market is estimated USD 1.4 billion in 2022 and is expected to grow to USD 19 billion by 2027. Growth is expected in North America, Europe, Asia Pacific, and RoW\* countries (5). This modified form of proteins that is generally obtained using byproducts of oil processing has tremendous potential as a food ingredient.

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# NEED FOR NUTRITION EDUCATION IN INDIAN WOMEN

AUTHORS



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September is celebrated as "Rashtriya Poshan Maah" in India. Wishing everyone a very happy and healthy National Nutrition Month!

The theme for 2024 is, "Nutritious Diets for Everyone," which emphasizes the importance of making balanced, healthy eating accessible to all. The motto is raising awareness about the vital role of nutrition in maintaining overall health and well-being by advocating inclusive nutrition strategies that cater to diverse needs, ensuring that everyone has the opportunity to benefit from a wholesome diet. This theme encourages community efforts to promote food security, educate on healthy choices,

and support sustainable practices that contribute to the well-being of all individuals.

Nutrition is one of the strongest pillars of good health. But problems like Malnutrition persist in various communities. Malnutrition, especially among women, is an intriguing problem in India. It is a critical public health issue that affects women across various age groups

and stages of life. The cycle begins with inadequate nutrition in women, which can lead to a range of health problems, including anaemia which nowadays is very common, sarcopenia in later years of life due to low muscle mass, coupled with poor protein intake. These conditions can impair cognitive function, reduce physical work capacity, and increase the risk of chronic diseases such as diabetes and hypertension.



## Malnutrition & its Consequences on Future Generations:

Malnutrition does not mean only undernutrition. There is also hidden hunger where there are micronutrient deficiencies resulting from a poor nutrient-quality diet. During pregnancy, maternal undernutrition and micronutrient deficiencies can result in adverse outcomes for both the mother and child. This includes an increased risk of complications during pregnancy and childbirth, low birth weight, and stunted growth in infants. The malnutrition cycle continues as malnourished children grow into undernourished adults, perpetuating the cycle and affecting the overall health and progress of the community. Poor maternal dietary patterns, characterised by low energy intake, macronutrient imbalances, and inadequate micronutrient consumption, can have long-lasting effects on future generations. In addition to addressing current health challenges, nutrition education for Indian women is essential for breaking the nation's decades of cycle of

malnutrition.

According to a survey done by Sight and Life Foundation, it was found that a girl child is breastfed for 8 weeks less than the average boy. Only 21% of girls aged 6 to 23 months are fed an optimal, complementary diet. So, there is malnutrition which starts very early on in life for a woman. It was also observed that only 20% of 6-59 months old children received vitamin A supplementation in the past 6 months, despite it being an essential nutrient. On the other hand, looking at educational qualifications, only 15% of women in the age group of 15 to 39 years of age have completed 8 to 9 years of education, and 22% of the girls in the age group of 6-24 years old have no education (1).

Women face a lot of challenges in society due to societal stereotypes, the burden of responsibilities, and neglect of their health. The nutritional status of Indian women varies significantly across regions, socio-economic strata, and educational levels. The National Family Health Survey-5 (NFHS-5) data indicates a concerning health status among Indian women, with high rates of anaemia, low Body Mass Index (BMI), and lifestyle diseases. This emphasizes the role of nutrition

education in breaking the cycle of malnutrition and its impact on future generations.

The demographic and health status of Indian women shows the low percentage of women with higher education and internet usage, early marriages, and inadequate antenatal care. Studies show poor muscle health and low protein levels, as well as a high prevalence of chronic energy deficiency among Indian women. Our population's diet is mainly based on cereals and recommended proteins from pulses, legumes, nuts, milk, and flesh foods, which contribute to good quality protein. It is found to be lesser in rural than in urban populations. Due to the cost factor, there is a low consumption of fruits and vegetables along with a low intake of milk and milk products. This could be attributed to the increased risk of diabetes, hypertension, as well as obesity. As per the NMMB 2017 survey, nearly 11% of adult women have chronic energy deficiency.





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Serving Suggestions



### First 1000 days of life:

There is a lot of importance of nutrition during the first 1000 days of a child's life, which includes the period from conception to the child's second birthday. During this time, eating a wholesome, balanced diet is essential. A child's growth, immune system, and organ development are all impacted by the nutrition they eat. Damage that cannot be reversed, such as stunted growth, decreased immunity, and compromised cognitive function, can result from malnutrition or inadequate nutrition. During this period, a child's physical, cognitive, and emotional health can be greatly impacted by appropriate nutrition and nurturing. The first 1000 days of life is a window of opportunity to enhance health outcomes for people at all stages of life, not only in childhood.

Nutrition before and during pregnancy is essential. Micronutrients that are important for foetal development include folic acid, iron, and iodine. Folic acid is an important nutrient of focus even before conception. A well-

balanced diet high in protein, vitamins, and minerals promotes the baby's growth and helps guard against any adverse events.

### Role of Nutrition in Women's Health and Well-Being:

Nutrition plays a pivotal role throughout a woman's lifespan, with nutritional needs varying from childhood to adolescence, pregnancy, menopause, and old age, with an emphasis on her physical, mental, and reproductive health.

### Adolescence:

Adolescence is a "window of opportunity" as it is a vulnerable group when rapid physical growth increases nutrient demands. It provides an opportunity to correct nutritional deficiencies that may have occurred in early life to catch up on growth and to establish good dietary behaviours. Due to the rapid growth and hormonal changes that occur during adolescence, dietary diversity, nutrient adequacy and density becomes extremely important (2). Sufficient consumption of calories, protein, calcium, and iron is important for the development of growth spurts, bone formation, and the start of menstruation. During this stage, iron deficiency anaemia is a big concern.

Also, snacking patterns in adolescents and young adults can be a significant contributory factor towards the early onset of obesity and other non-communicable diseases (3). It is important to consume foods high in iron combined with vitamin C to improve absorption. During this period, inadequate nutrition might cause long-term health problems, irregular menstruation, and delayed growth.

There is high intake of pro-inflammatory HFSS foods coupled with inactivity and inadequate sleep seen in this age group resulting in increased body fat, poor muscle mass predisposing them to increased risk of Obesity, PCOS, and metabolic syndrome.

Strength training coupled with a wholesome, balanced diet with emphasis on protein, micronutrients, and a diet rich in polyphenols must be emphasised to prevent the risk of sarcopenia and other metabolic conditions in the later years.





### Reproductive years:

Maternal diet in India has low energy, macronutrient imbalance and inadequate micronutrient intake (4). According to NFHS 5, 52.2% of pregnant women between the ages of 15 and 49 have anaemia. Women's nutritional needs grow significantly during pre-conception and pregnancy. Hence, prenatal nutrition is very important to ensure the woman is nourished well and meets her nutritional needs as well as that of her baby. Maternal and foetal health is supported by a diet rich in essential fatty acids, calcium, iron, Vit B12, Vit D and protein.

Iron, omega-3 fatty acids, folic acid, and other nutrients are essential for healthy reproduction and lower the risk of birth abnormalities. In particular, folic acid is essential for avoiding neural tube abnormalities and needs to be taken both before and during the early stages of pregnancy. Hence consulting her gynaecologist and nutritionist become important before and during pregnancy.

Lactation is another critical period noting the lack of dietary diversity among lactating mothers and the associated risk of nutritional deficiencies. Counselling is vital in improving dietary practices. Postpartum recovery and lactation are

also influenced by a good diet. Extra calories, protein, and fluids are needed by nursing mothers to maintain their health and produce enough milk.

However, eating for two, high in calories and poor nutrient quality which is very commonly seen during pregnancy and lactation due to traditional beliefs must be discouraged due to higher risk of obesity, gestational diabetes, type 2 diabetes and other health issues. Regular follow up visits with the doctor and nutritionist must be encouraged to ensure optimum weight, health and nutrition status.

### Menopause:

In the menopausal transition, low oestrogen levels have been associated with loss of lean body mass (LBM) and an increase in fat mass (FM). Low levels of oestrogen raise the risk of osteoporosis. To preserve bone density and avoid fractures, one must consume enough calcium and vitamin D. ICMR suggests 1200mcg Calcium/day especially after menopause to cover at least the obligatory extra loss of 30 mg/day of calcium in the urine. Fortified meals, dairy products, and sunlight exposure are important

sources of vitamin D. Weight gain is frequently seen as a result of hormonal changes that occur during menopause, especially around the abdomen. Following menopause, metabolic syndrome, sarcopenia and the risk of cardiovascular disease increase. A diet rich in fruits, vegetables, dietary fiber, and omega-3 fatty acids and low in saturated fats can help control cholesterol and promote heart health. Oxidative stress is connected to heart disease, and foods high in antioxidants protect against it. Intake of phytoestrogen-rich foods like nuts & oilseeds, berries, legumes, soy products etc must be emphasised during this period.

The integral health care of menopausal women should therefore emphasize lifestyle assessment, nutrition education and counselling to counterbalance the negative effects of oestrogen deficiency on general well-being and minimize the risk of any conditions. Lifestyle Modification-Impact both longevity and quality of life.



### Older adulthood:

While a woman's calorie requirements may decrease with age, her nutritional requirements may not. Particularly crucial for bone health, energy levels, and cognitive function are nutrients like calcium, vitamin D, Vit B12, Magnesium and B vitamins. Dehydration can result from age-related changes in the kidneys as well as a reduced sense of thirst. In order to keep the body functioning normally and avoid urinary tract infections, staying hydrated is important. A balanced diet with low-sodium foods, high-fibre options, and anti-inflammatory nutrients can help manage symptoms and improve quality of life.

The vicious cycle of malnutrition in Indian women has far-reaching health implications that can be mitigated through improved nutrition education and interventions that focus on the rights and well-being of women and their families. The

significance of nutrition education for Indian women as a means to improve health outcomes and contribute to the progress of families and society is crucial. To tackle this, the Alive & Thrive (A&T) project is started which is an initiative designed to advance the implementation of maternal, infant and young child nutrition (MIYCN) social and behaviour change (SBC) at a large scale (5). It provides lessons on implementing large-scale nutrition interventions and calls for a rights-based approach to ensure wholesome nutrition for women.

In conclusion, adequate nutrition is primarily an issue of rights and not just in utility alone therefore wholesome nutrition in women, plus good health and proper education and empowerment will result in better performances at schools, colleges, and work.  
#HealthyWomen  
#HappyLives

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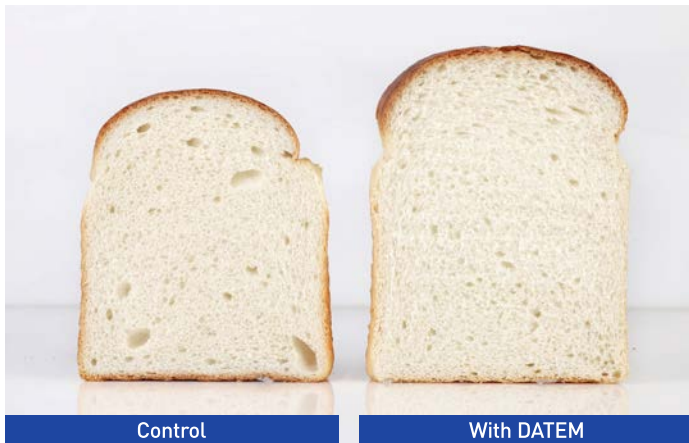
# DATEM Powder (E 472e): For Bakery Applications



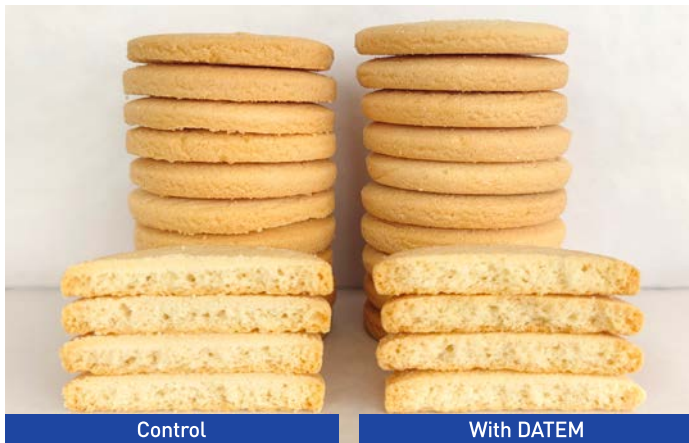
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# FOODS OF DESIRED ATTRIBUTES THROUGH **EXTRUSION**



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Extrusion process has been used for a long time not just for making noodles and other pasta products or ground meat but also some very traditional products like semiyam, sev, gathia, chakli (murukku) and others that have been prepared by our grandmothers at home using hand operated domestic press.

Extruders are used for a variety of interesting products with different shapes, sizes, appearance, texture, mouthfeel and cannot just prepare fun foods but also highly nutritious, easily digestible and also fortified food products.

Since extrusion is a very useful process to prepare many different types of food products, right from simple home products to sophisticated products, the market for such products has increased enormously. The global market has been estimated to be near US\$ 100 billion (1) and while there is a large unorganised sector involved in extruded products in India, the estimate of processed food industry is over US\$ 27 billion as per Ministry of Food Processing Industry (2).

Extruded foods in India, fall mostly in the category of extruded snack foods, which is estimated at around US\$ 500 million (3). Other extruded foods include such foods as noodles, pasta, semiyam, soya or millet-based foods, breakfast cereals, meat-substitutes, pet foods etc. and this sector is as large, if not

bigger than the snack foods. Thus, extruded food market is small compared to global, it is rapidly growing as some fortified products are easily made with this technology.

## Process of Extrusion

Although extruded foods were prepared by piston type extruders operated by hand or electrically, the modern extruders were developed in 1930s for dry pasta and breakfast cereal pellets and later for pet foods. Its versatility enabled use for texturing, mixing, forming, reacting and cooking of food products. It is now being used for one step manufacture of hundreds of food products including traditional snacks, breakfast cereals, pet foods, ingredients, chewing gum, confections, pasta, textured vegetable protein, premade cookie dough, baby food, processed cheese, bread and others (4).

# VITAMIN D KI TAAKAT





The system includes the food material being forced through a small aperture by either a piston, as in traditional manual press or by a single, twin or several screws. The food may be cooked prior to loading or within the process itself using high pressure, shear and temperature created by screws within a barrel. As food exits, material experiences release of pressure converting water to steam. This causes expansion depending on conditions used with consequent increase of

volume and change in texture (5). The process can be continuous or batch and is very short often a minute or so. Several operations such as mixing, kneading, cooking, forming and cutting etc. all done in single equipment. The process and equipment are quite cost effective so the product can be prepared economically.

When multiple raw ingredients are used there may be a need for mixing to get the uniform feed material otherwise the properties of final product will be variable depending on the composition of material coming through the die. After the extrusion process, the product may need cutting, drying, seasoning or coating.

Property of extruded product depends on ingredient composition, process conditions and operations used after extrusion. Following table gives various applications.

### Operation of Extruders

With about the similar design the equipment produces a large number of varied products of different properties. The variables that control the process are from 3 types: a. Raw material composition and formulation, b. dimensions of screw as well as operating conditions of temperature, time etc. and c. die design at exit.

Piston and ram-extruders operated commonly below 100° and called cold extruders, are still being

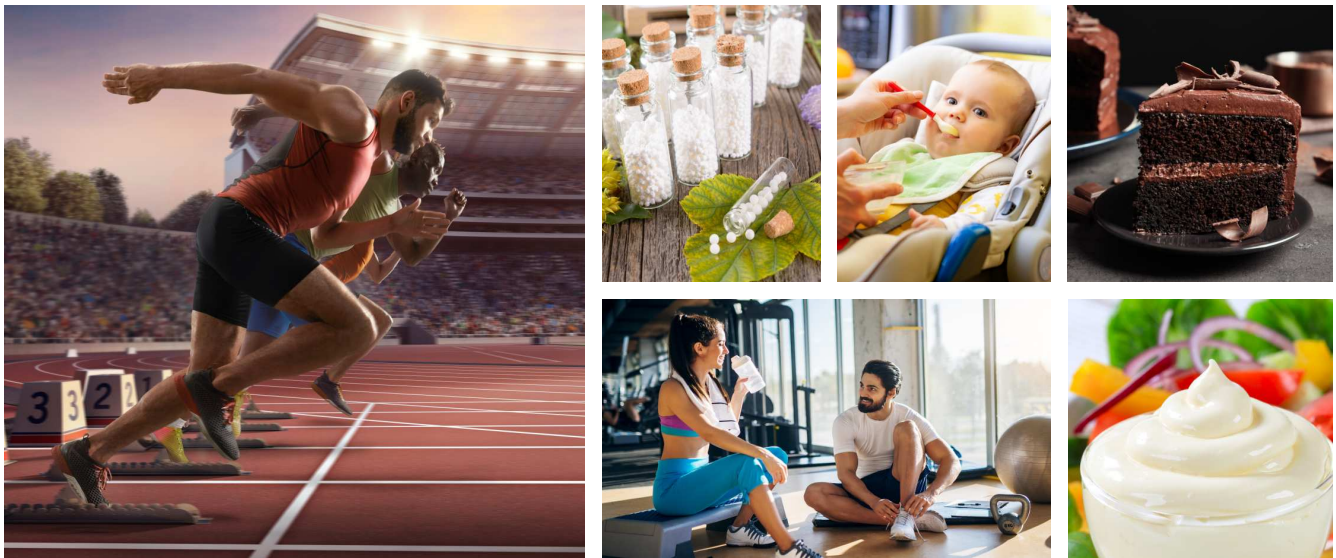
Table 1: Applications of Extrusion Process

Applications of extrusion cooking	
Bread crumbs	Degermination of spices
Precooked starches	Flavor encapsulation
Anhydrous decrystallization of sugar to make confectioneries	Enzymatic liquefaction of starch for fermentation into ethanol
Chocolate conching	Quick-cooking pasta products
Pre-treated malt and starch for brewing	Oilseed treatment for subsequent oil extraction
Stabilization of rice bran	Preparation of specific doughs
Gelatin gel confectioneries	Destruction of aflatoxins or gossypol in peanut meal
Caramel, licorice, chewing gum	Precooked soy flours
Corn and potato snack	Gelation of vegetable proteins
Coextruded snacks with internal filling	Restructuring of minced meat
Flat crispbread, biscuits, crackers, cookies	Preparation of sterile baby foods
Pre-cooked flours, instant rice puddings	Oilseed meals
Cereal-based instant dried soup mixes or drink bases	Sterile chees processes
Transformation of casein into caseinate	Animal feeds
Pre-cooked instant weaning foods or gruels	Texturized vegetable proteins



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Cold Extruder

used for processing meats and sausages as well as fish pastes, surimi and pet foods, noodles & pasta products, sevian, chakli etc. Much of production now uses single or twin-screw extruders operated above 100° and called cooker extruders, for continuous processes. Twin-screw, although more expensive, is very commonly used because of its versatility of handling variety of raw materials and producing

large number of products. Food extrusion process comprises of following steps.

Raw materials are received and ensured that they are of uniform quality and character as this is very crucial for product consistency. Any change in raw material characteristic will change the final product properties. When the raw material consists of several ingredients, it is important to mix them thoroughly so the feed is uniform at different times. There is no possibility of further mixing once the raw material enters the screw.

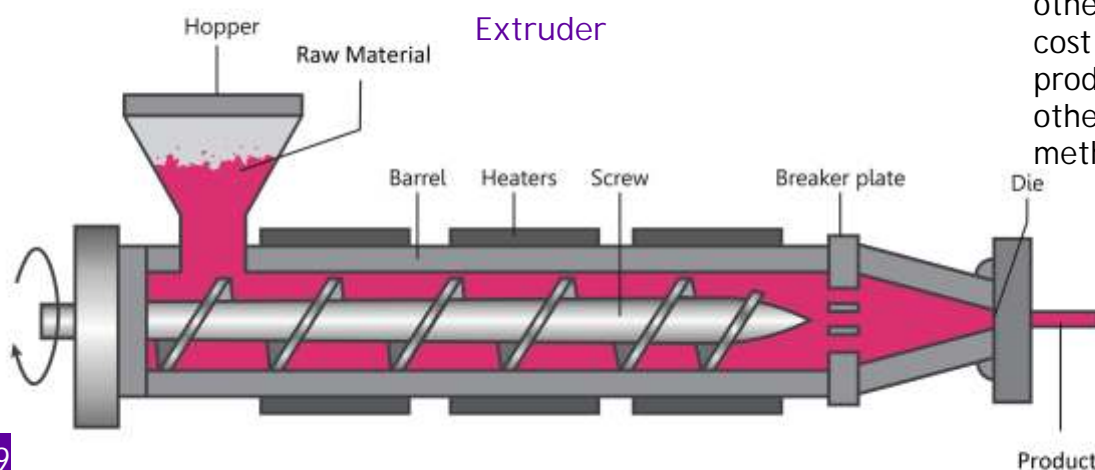
Raw material is fed to the screw-extruder by a hopper and because of the screw design it travels through various zones towards the die exit experiencing increasing temperatures, pressure and shear. The ingredients experience melt state by the time they come to exit where the die lets it out in different shapes and sizes. As the material comes out it suddenly experiences a tremendous drop in

pressure that causes rapid expansion and cooling. Extent of changes could be controlled by adjusting temperature, pressure, addition of water and time of movement through the barrel. The properties including final shapes, sizes, porosity, friability, texture, appearance, density and various other properties will all depend on the composition of raw material and conditions of temperature, pressure and shear inside the barrel. The figure below gives an idea about the screw extruder.

The extruded product coming out of the die may then be further processed by drying, seasoning, coating, sometimes fried and packing.

### Advantages of Extrusion Technology

Extrusion has become very popular because of many advantages (6). The process is highly versatile as large variety of products can be made using different combinations of ingredients, process conditions etc. that are not easily possible by other methods. Processing cost is quite low with high productivity compared to other methods. Traditional methods of making cornflakes etc become more efficient and cheaper by extrusion.



Extruder



High production rates are possible with automated operation with extrusion. Product quality remains high when high temperature short time process is used to retain heat sensitive components and to eliminate microbial contamination. As extrusion is a low-moisture process producing no process effluents, it eliminates water treatment and environmental pollution.

Diverse raw materials are

used in this process including cereals, starches, tubers, oilseeds, legumes, meat and various proteins. Starch and protein provide structures, and water, fats and emulsifiers provide lubrication. Variables like temperature, moisture and screw speed affect expansion ratio, bulk density, water absorption, water solubility and hardness of product. Starch has ability of expansion more than others while sugars may cause colour. Higher proteins may affect brittleness, hardness and crispness.

Extrusion cooking causes gelatinisation in starch as well as hydrolysis leading to a fluid melt during extrusion

that traps water that expands after coming out of die. Fats, sugar, dietary fibre and salts may control gelatinisation. Recently, there has been criticism of extruded products saying this reduces dietary fibre and there are vitamin losses. This is only seeing only negative side. Extruded products are also made using cold processes below 100°C wherein there is minimal vitamin losses and hardly any effect on dietary fibre. Even the changes in dietary fibre in hot extruder occurs mostly from insoluble to soluble fibre with slight losses of soluble fibre to sugars. Besides there are many benefits of extrusion that more than compensates for such losses.

Table 2: Comparison between Cold & Hot Extrusion (7)

S/N	Characteristic	Cold extrusion	Hot extrusion
1	Temperature	This process is carried out at or near room temperature.	Involves heating food materials to higher temperatures usually above 100 °C.
2	Material Properties	Suitable for stable solid or semi-solid foods that can maintain their structure without significant heating.	Used for materials that require cooking or other thermal modifications to achieve the desired texture or consistency.
3	Effect on nutrients	Increased vitamin retention, reduced protein denaturation, minimal impact on starch, fiber, and fats, thus lowering the risk of oxidation and rancidity.	Reduced vitamin retention, increased impact on protein texture, carbohydrate and fiber structure changes, and higher risk of lipid oxidation.
4	Product Characteristics	Generally results in products with denser and firmer texture.	Allows for the creation of expanded and porous products.
5	Equipment	Pasta machines, dough extruders, and specialized molds or dies for shaping various food items.	Extruders that heat and cook food under controlled conditions. Dies and molds may also be used to shape the extruded product.
6	Energy Consumption	Generally consumes less energy since it doesn't involve significant heating processes.	Requires energy for heating the food material. Energy may vary depending on the product and processing requirements.
7	Product Variety	Well-suited for producing products like pasta, noodles, certain snacks, dough-based items, and some confectionery items.	Allows for diverse products like expanded snacks, breakfast cereals, meat analogs, textured vegetable proteins, and other thermally processed food products.
8	Cooking and Gelation	Doesn't involve cooking or significant gelation. Post-extrusion cooking or further processing may be required for certain products.	Can involve cooking, gelatinization, or partial denaturation of proteins leading to cooked or partially cooked products with specific textures and properties.



Healthy lifestyle demands inclusion of cereals, legumes and other plant materials in diet which could be done easily by extrusion with

using extrusion. Protein concentrates and isolates from soy, pulses and cereals can be converted to textures resembling animal products using denaturation, fluidisation and alignment using extrusion.

Extrusion converts insoluble fibre to soluble this enhances functional properties improving expansion capacity. Proteins undergo denaturation improving digestibility. Enzymes present are deactivated due to high temperature and shear.

Vitamin losses are expected due to high temperatures, but due to HTST-type treatment, losses are lower than conventional long-term cooking. Extrusion enhances mineral bioavailability by destruction of phytates and other antinutrients such as tannins, lectin, enzyme inhibitors, saponins and oxalates. It also destroys microbial activity making food safer.

### Applications

Extrusion can contribute significantly to produce foods for human consumption, pet foods and value-added foods from waste and by-products. Not only is it efficient and cost-effective, it facilitates reintegration of food processing by-products and residues contributing to sustainability.

cooking and modification using flaking, toasting, puffing, shredding etc. making them suitable for human consumption. Even cold extruded products like pasta are useful. Breakfast cereals can be prepared using composite flours, even from whole grain flours with enhanced nutritional benefits.

Extrusion is versatile in making chewy and gelatinised products such as fruit gums and licorice. Several other confectioneries including crisp bread, boiled sweets, creams, toffee, fudge and chocolate and snack products including high-fibre, low-calorie, high-protein snacks with large variations of shapes, sizes, texture, mouthfeel, flavour and colour could be prepared.

Important group of products such as meat analogues and extenders that are becoming very popular can be made with desired composition and nutrition profile

Fortification is another very important application wherein soluble fortificant could be incorporated into food in such a manner that it does not wash away during food preparation. Even some analogues could be made to look like common foods like soya or some other high protein ingredient could be converted to look like dal or pulses so people could use them in familiar formats.

Low-temperature extrusion has been used for high quality dairy products including butter and ice cream. Extrusion cooking for pet foods is useful for inactivation of antinutritional components, enhancing digestibility and making especially suitable for young animals.





A very important application of extrusion is processing wastes from diverse operations of fruits, vegetables, dairy, meat, grain, bakery, sugar, confectionery and many other products that are rich in antioxidants, essential fatty acids, dietary fibre, micronutrients and phytochemicals, into a range of food products. Extrusion is a valuable tool to handle various raw materials of diverse properties.



### Conclusion

Extrusion has been used for a long time. Cold extrusion has been used for many traditional food products and is still being used. Many pasta products are prepared by extrusion and has many applications that may not only be useful in reducing waste and helping

sustainability by using some ingredients that are difficult to consume as such.

Although there are some nutrients being affected by high temperature and pressure processes, there are some advantages also due to its positive effects of reducing losses of nutrients. Versatility along with cost-effectiveness makes it the process of choice for new product development.

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# RISK ASSESSMENT (PART 3): CHEMICAL RISK ASSESSMENT OF GLOBAL REGULATORY FRAMEWORKS<sup>#</sup>

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<sup>#</sup>This article is part of a series of articles to be published on the topic of Risk Assessment.

## Introduction

Ensuring food safety is of utmost importance for the purpose of protecting consumer's health and providing safe and wholesome food to everyone. Primarily, there are three types of hazards in foods namely, physical, chemical and microbiological. This article is part of a series of articles to be published on the topic of Risk Assessment. In continuation to the previous

article regarding the risk analysis frameworks of various nations, this article aims at critically reviewing the risk assessment of chemical hazards in foods through some case studies. Hazards may be naturally present in food or are developed during processing and handling of foods. An integrated and comprehensive methodology covering entire food chain including feed, animal health, protection of plants,

food production, processing, storage, transport and distribution is required to mitigate the risks associated with chemical hazards. ([https://www.eca.europa.eu/lists/ecadocuments/sr1902/sr\\_food\\_safety\\_en.pdf](https://www.eca.europa.eu/lists/ecadocuments/sr1902/sr_food_safety_en.pdf)).

Chemical risk assessment comprises of a wide array of disciplines including physical, chemical, biological, and engineering sciences apart from biochemistry, toxicology, cell biology, epidemiology, mathematical modelling and kinetics.



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### Chemical risk analysis:

JECFA acts as the scientific advisory board to Food and Agriculture Organization of the United Nations (FAO) and the World Health

Organization (WHO), and to the Codex Alimentarius Commission (CAC). On the basis of risk assessments carried out by JECFA, Codex Committees on Food Additives (CCFA) as well as Contaminants (CCCF) forms standards on chemicals found in foods.

All the nations require well-structured risk assessment of chemicals, but there is limited availability of experts and finance to conduct risk assessments on wide array of chemicals. JECFA performs a key role for the same that can be considered globally to develop the associated safety measures.

In order to evaluate food additives, JECFA defines their acceptable daily intakes (ADIs). It also establishes tolerable limits on the basis of their toxicological studies, thereby specifying provisional

tolerable weekly intakes (PTWI) or provisional maximum tolerable daily intakes (PMTDI), as required. These limits are assigned on the basis of No-observed-effect-level (NOEL) levels demonstrated through toxicity studies and the application of appropriate safety factors. It should be highlighted that absence of tolerable levels does not signify that maximum limits cannot be determined.

JECFA prepares the specifications for food additives, processing aids, flavouring agents, veterinary drug residues, contaminants, and natural toxins, etc forming an integral component of risk assessment.

The advisory body also formulates the principles for safety assessment of chemicals in foods in line to the risk assessment, toxicology and other sciences (<https://www.fao.org/food/food-safety-quality/scientific-advice/jecfa/en/>).

The primary objectives of chemical risk assessment include determining the level of chemical exposures (exposure assessment) for a particular specie or group, analysing the various pathways of exposure, establishing safe concentrations (hazard identification and characterisation), and quantifying the potential risks owing to such chemical exposures (risk characterisation)

(<http://books.rsc.org/books/edited-volume/chapter-pdf/1618226/bk9781788018951-00001.pdf>).

Furthermore, risk assessment of chemical hazards requires predictive methodology providing risk managers with detailed information on uncertainty measurements, level of significance and acceptability in acceptable daily intake (ADI) and exposure estimates ([https://doi.org/10.1007/978-1-4613-1111-9\\_2](https://doi.org/10.1007/978-1-4613-1111-9_2)).

### WHO and Joint Expert Committee on Food Additives (JECFA) on



As mentioned in previous articles, Risk assessment of food chemicals can be explained as specifying the significant hazards and the associated risks due to exposure of humans to chemicals in food for certain duration. The components to conduct the risk assessment or safety assessment for food chemicals constitute four steps namely, hazard identification, hazard characterization, exposure assessment and risk characterization, forming a systematic structure providing a well-defined framework to assure chemical safety and determining health outcomes owing to exposure. The data obtained from risk assessment forms the basis for risk management as a sequential step.

Hazard identification being the initial step of risk assessment aims at identifying the type and nature of harmful effects due to the exposure of chemical. The following step namely, Hazard characterization involves explanation (qualitative or quantitative) of the intrinsic features of the chemical possessing adverse effects. In addition to that, dose-response assessment along with probable uncertainties is also considered. The sequential step of Exposure assessment of chemicals involves the qualitative

and/or quantitative determination of probable intake of chemicals through food and other sources.

For food chemicals, dietary exposure assessment considers a number of factors such as, occurrence and level of the chemical, the dietary pattern, the probability of consumers taking large quantities of foods in concern.

Generally, an extent of consumption and exposure judgement is provided which further is categorized according to age groups. The final step of risk assessment namely, Risk characterization accounts for the qualitative and/or quantitative estimation comprising of considerations like uncertainties, likelihood of occurrence of adverse effects of chemicals, and population subgroups under different exposure scenarios. Risk characterization utilizes the information obtained from the first three steps which can further be useful for decision making during risk management ([https://iris.who.int/bitstream/handle/10665/44065/WHO\\_EHC\\_240\\_5\\_eng\\_Chapter2.pdf?sequence=5](https://iris.who.int/bitstream/handle/10665/44065/WHO_EHC_240_5_eng_Chapter2.pdf?sequence=5)).

Outcomes of JECFA risk assessments are published in their regular updates as well as on their website



([https://www.who.int/groups/joint-fao-who-expert-committee-on-food-additives-\(jecfa\)/publications](https://www.who.int/groups/joint-fao-who-expert-committee-on-food-additives-(jecfa)/publications)). These risk assessment outcomes are referred globally by almost all national authorities, not only while conducting their own risk assessments, but also in deciding risk management options.

Some other global examples of use of risk assessment of chemical hazards are given below for a broader understanding of use of risk assessment framework by various governments.

### Case Study: Risk assessment of a food additive 'Advantame'

In 2009, a study regarding safety assessment of Advantame was carried out by the Food Standards Australia New Zealand (FSANZ) for its use as a sugar substitute in different foods and beverages to support weight management.





Till then, no information was available in terms of its toxicology and ADI. FSANZ carried out an exhaustive risk assessment comprising of over 50 toxicological studies, covering various aspects of kinetics, metabolism, acute toxicity, repeat-dose toxicity, genotoxicity, immunotoxicity, and reproductive and developmental issues. In-vitro studies were performed to establish its ADI. FSANZ also looked for an external review over toxicological report concluding that assessment was scientifically evident. Furthermore, a dietary exposure assessment was done for both the countries utilizing food consumption data in relation to the proposed maximum concentration of Advantame in the food products. The whole food group to which specific foods belonged was undertaken for the study resulting in safe determination of dietary exposure. Based on substantial data, 5 milligrams per kilogram of body weight per day was documented as an ADI for Advantame posing no

adverse effects on health and safety concerns.

In order to confirm the usage of Advantame, FSANZ reviewed two options including determination of the

maximum permitted levels and the use of Advantame according to Good Manufacturing Practices. FSANZ determined that for a person weighing 60 kg an intake of 300 mg Advantame/day will exceed the ADI of 5 mg/kg bw. FSANZ inferred that there were no defined risk required to be managed by establishing maximum permitted levels in foods, permitting its usage in a variety of food products. Moreover, self-limiting usage of Advantame due to its intense sweetness, and when used at the proposed levels the dietary exposure was well below the ADI. Besides, general labelling specifications as mentioned in the code such as declaration of food additives would ensure the availability of appropriate information to the consumers. Advantame would be declared in the list of ingredients with its food additive class i.e. sweetener followed by its specific name or number. Furthermore, public submissions were also undertaken and assessed to complete the assessment procedure and draw the

appropriate conclusions. It was further notified through FSANZ's food standards notification circular and other media sources. Moreover, FSANZ frequently publishes updated information about the application of sweeteners in food products (<https://www.foodstandards.gov.au/sites/default/files/publications/riskanalysisfoodregulation/Documents/risk-analysis-food-regulation-full-pdf.pdf>).

### Case Study: Risk assessment of a naturally occurring toxicant in food 'Cyanogenic glycosides'

Cassava, a hardy plant contains Cyanogenic glycosides, may pose health risks to consumers. The primary Cyanogenic glycoside in cassava is linamarin constituting 93% followed by lotaustralin around 7%.

In 2008, Japanese authorities raised the concern to Australia regarding higher levels of cyanogenic glycoside in a cassava based snacks manufactured there posing adverse health effects.



Processing of cassava before consumption is of great significance in reducing the concentration of cyanogenic glycosides. Appropriate processing methods such as peeling, grating, soaking in water and mild heat treatment result in the conversion of linamarin to hydrogen cyanide (HCN) which being volatile is released into the air.

Acute toxicity of cyanogenic glycosides results in headaches, dizziness, stomach pain or mental confusion. Considering the data available on fatality in hamsters at doses higher than 70 mg/kg bw and after applying a 100 fold inter and intra- species safety factor, FSANZ established an acute reference dose (ARfD) for linamarin as 0.7 mg/kg bw which was converted to an ARfD of 0.08 mg/kg bw for total HCN.

As a part of follow up, Australia analysed 300 samples of domestic and imported cassava based snacks and observed high concentration of HCN and significant differences in the levels ranging between less than 10 and 145 mg/kg. In addition to that, a dietary

exposure assessment was carried out using the data from the analysis of 300 products and consumption database reported earlier. Since consumption data specifically for cassava chips was unavailable thus, data for similar snacks was used.

Both deterministic and probabilistic assessments were conducted. The observations obtained from deterministic model were compared with ARfD and it was concluded that for all the groups assessed, HCN level of 63 mg/kg might result in dietary exposure above ARfD. Amongst the population groups, children between 2 and 4 years were the most susceptible to the risk of exceeding the ARfD, even at the minimum level of 10 mg/kg. In probabilistic model, it was observed that an average concentration of HCN of 63 mg/kg could lead to dietary exposures exceeding ARfD. The probability of occurrence amongst children of 2 to 4 years was reported to be 56%, which further reduced to 2 to 4% at a minimum concentration of 10 mg/kg. Consequences of HCN concentration above ARfD were also dependent on exposure in terms of number of sitting considering that this quantity could be consumed in one sitting. The dietary



assessment study showed that under-processing of raw cassava could lead to detectable concentration of HCN in cassava chips.

Considering the initial advice of toxicological experts indicating that consumption between 100 and 200 g might result in mild symptoms, manufacturers were well informed and agreed over recall of the concerned product. Keeping in view all the public submissions, a maximum limit for HCN in cassava chips was established as 10 mg/kg. Moreover, as advised by FSANZ, the Department of Agriculture conducted the testing of imported products. Based on the observations obtained from the analytical tests, preliminary risk communication was done using various media sources. Consumers, specifically children were advised to avoid consuming large amount of ready to eat cassava snacks (<https://www.foodstandards.gov.au/sites/default/files/publications/riskanalysisfoodregulation/Documents/risk-analysis-food-regulation-full-pdf.pdf>).





to chemical risk assessment provide a fair idea towards safety limits and other considerations. Thus, a number of factors may affect the severity of

adverse effects posed by the chemicals in foods, therefore must be assessed critically using risk assessment methodology.

A comprehensive review of scientific data on occurrence of a hazard, processing techniques used, all probable routes of exposure and evaluation of risk to sensitive population groups are integral parts of the process.

Such an integrated approach also helps to focus the risk assessment as well as risk management efforts on actual risks rather than potential hazards, which ensures that control measures are proportionate

to the risk posed by hazards.

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- <http://books.rsc.org/books/edited-volume/chapter-pdf/1618226/bk9781788018951-00001.pdf>
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## Conclusion

Chemical risk assessment is crucial to food safety. It is conducted utilizing four steps namely, hazard identification, hazard characterization, exposure assessment and risk characterization providing a systematic, well structure and scientifically evident framework of risk assessment.

WHO guidelines along with JECFA recommendations form the basis of chemical risk assessment in foods specifying ADIs, PTWI, PMTDI, and NOEL, etc.

Both deterministic and probabilistic models applied





# BUILDING A BETTER BREAKFAST: THE IMPACT OF NUTRITION ON OPTIMAL HEALTH

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For generations, the saying “Eat breakfast like a king, lunch like a prince, and dinner like a pauper” has emphasized the significance of starting the day with a hearty meal. Despite this, many individuals, including children, regularly skip breakfast.

The reasons for skipping this essential meal are diverse ranging from personal preferences to regional challenges. Factors such as time constraints, fad diets, a personal choice of not being a breakfast person, or simply the lack of access to nutritious options, especially among underprivileged children in our country, all contribute to this issue.

While efforts are being made to improve access to nutritious breakfasts for underprivileged children through various food programs, the consequences of skipping breakfast on a whim are wide-ranging, affecting physical health, internal functions, and even cognitive abilities. An article in the Harvard Health Letter has established a link between regular breakfast consumption and a reduced risk of obesity, diabetes, and heart disease.

Starting the day with a well-balanced meal positively influences your circadian rhythm, commonly known as the biological clock. Eating a healthy breakfast within two hours of waking up refuels your body,

replenishes glucose levels, and regulates metabolism, setting the stage for an energetic and productive day.

## What Constitutes a Balanced Breakfast?

When I ask people what they consider a balanced breakfast, they often mention a combination of ingredients like milk, fruits/vegetables, eggs/idli, and bread/dosa. A balanced breakfast is defined as a nutrient-dense meal, which includes a healthy mix of carbohydrates, fibre, protein, vitamins, and minerals from various food groups like grains, fruits/vegetables, and dairy.



Carbohydrates and proteins regulate appetite and energy, with proteins playing a crucial role in muscle growth and maintenance. Meanwhile, vitamins and minerals support various bodily functions essential for growth and development, and fibre improves digestive health, helps reduce blood cholesterol levels, and lowers the risk of heart disease.

### How to Ensure a Balanced Breakfast

There are numerous breakfast options available, making it easy to ensure that your morning meal provides the essential nutrients your body needs to start the day. To achieve this, include servings from each of the following food groups:

- **Whole Grains:** This diverse food group includes wheat, rice, corn, oats,

barley, and ragi, among others. Ready-to-eat breakfast cereals made from whole grains also belong to this category. Whole grains provide carbohydrates, particularly fibre, which is vital for health and well-being.

#### - Dairy or Lean Protein:

This group includes nutritious options like milk, yogurt, and cheese.

#### - Fruits & Vegetables:

Adding fruits and vegetables not only enhances the visual appeal of your breakfast but also ensures your body receives a variety of essential vitamins and minerals. Nuts like almonds, walnuts, pecans, sunflower seeds, and flaxseeds add crunch to your breakfast while providing micronutrients and healthy fats.

With these food groups in mind, you can prepare a balanced breakfast that offers carbohydrates (including fibre) from whole grains, protein from milk, yogurt, peanut butter, dals, sprouts, peas, or eggs, and vitamins and minerals from fruits and vegetables.

Interestingly, breakfast

cereals have become the most popular breakfast option today, favored by both adults and children. The rise in popularity is due to their convenience, fitting perfectly into a busy lifestyle, and the fact that they are nutritious and tasty. A bowl of breakfast cereal, best enjoyed with milk or yogurt and fruits or nuts, offers a balanced mix of carbohydrates, proteins, vitamins, minerals, and fibre.

### Balanced Breakfast Ideas to Try at Home

- A bowl of vegetable poha, a glass of milk, and a serving of your favorite seasonal fruits.
- A bowl of ready-to-eat breakfast cereal made with whole grains, a glass of milk, and sliced bananas, apples, or strawberries.
- Whole grain bread sandwiches loaded with fresh vegetables like cucumber, tomato, shredded carrots, and lettuce leaves, accompanied by a glass of buttermilk.
- A bowl of muesli with an abundance of fruits, nuts, and seeds, served with milk.



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# FREEZE-DRYING: MODERN TECHNOLOGY TO PRESERVE FRESHNESS & NUTRIENTS



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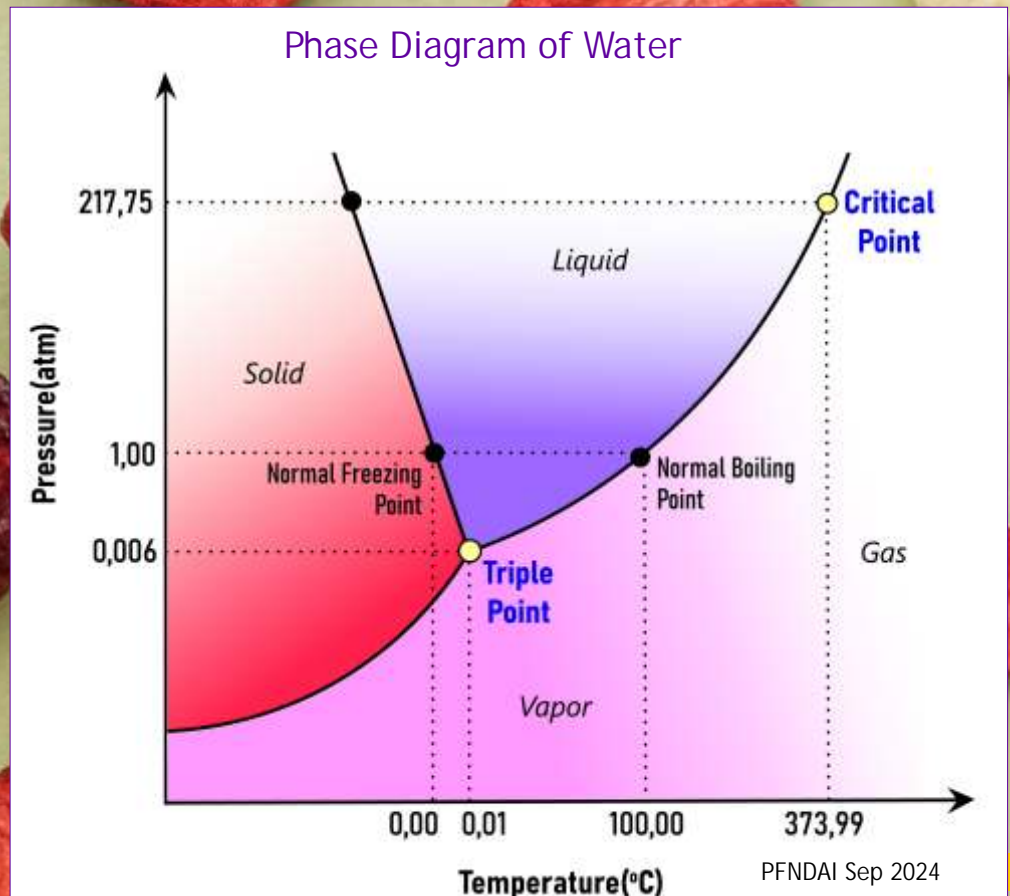
removal of some bound water as well as all ice water. Water under atmospheric conditions boils at 100°C and freezes at 0°C as shown in the above diagram. At a temperature lower than 0°C, it exists as ice. As it is heated it melts and by further heating beyond 100°C, it forms steam or

water vapour. As one lowers the pressure, by creating a vacuum, the water converts to vapour at a lower temperature and as the pressure is lowered to 0.006 atmospheres, it reaches the triple point of water. Below this pressure, ice directly converts to vapour without going through a liquid state of water. The process is called sublimation.

Freeze drying also known as 'Lyophilization' is a dehydration process used to preserve perishable materials and extend their shelf life. As the name suggests, the product is first frozen and water is removed from it through sublimation, where ice turns directly into vapour, eliminating the liquid stage. This creates a highly porous structure of the freeze-dried products allowing them to melt in the mouth instantly and rehydrate quickly (1).

## Phases of freeze-drying process

There are two types of water in the products: free water and bound water attached to the food matrix, which is hard to eliminate. The process of freeze-drying requires the





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The second stage of freeze drying is called primary drying, or sublimation, during which the food is heated, and pressure is reduced to sublimate the

This phenomenon is used in freeze-drying. Food temperature is lowered by cooling till it freezes. Then the pressure is reduced below 0.006 atmospheres, by applying high vacuum. Then heat is applied which will convert directly the ice to water vapour, without forming liquid water. Slowly the water is removed.

Freeze drying occurs in three phases: freezing, primary drying, and secondary drying. Freezing is nothing but solidification of water. Before the drying process, the material must be frozen. Freezing the material limits the chemical and microbiological changes and prevents foaming that occurs due to pressure reduction. The rate of freezing is important too, slower freezing creates large crystals that can break the cell walls and damage the structure. Hence rapid freezing is required to produce smaller crystals for minimal damage(3,2). After freezing, the pressure is lowered below the triple point so when heat is applied ice directly turns to vapour instead of melting.

water. A cold condenser chamber and condenser plates provide place where vapour is collected as ice. In this stage, about 95% of the free water in the material is eliminated. It is a slow process, and it is crucial to apply mild heat to avoid damage by excessive heat.

Final drying happens under low pressure which dries the product much more slowly because there's less water left, and this bound water is harder to remove. Low water content is crucial for the product's stability. It is important to remove as much as possible. Desorption is faster at higher temperatures and lower pressure which speeds up drying(1).

### Components and types of freeze dryer:

A freeze dryer comprises a chamber, condenser, refrigeration system, vacuum system and control system. The stainless-steel

chamber features multiple shelves for product storage and a vacuum-tight door closure. A process condenser converts sublimed vapours into solid ice, trapping water and requiring a temperature 20°C lower than primary drying. The refrigeration system cools shelves and condensers, while a vacuum system removes water during drying. The control system sets shelf temperature, pressure, and time values for various durations (3,5). Some important factors should be considered such as the scale of production, the nature of the material, and the industry's unique demands when choosing a freeze dryer. **Tray Freeze Dryers** are commonly used for small to medium-sized batches in research centres and labs. **Shell Freeze Dryers** are large-scale production equipment used in pharmaceutical, food, and biotechnology industries for freeze-dried products. **Rotary Freeze Dryers** are continuous high-volume machines used in industrial settings to produce large quantities of freeze-dried goods like coffee, fruits, and vegetables (4).



### Applications in food:

Early applications of freeze-drying dates to the 13th century, when the Inca freeze-dried potatoes by exposing them to freezing temperatures on Andean Mountain peaks at night and then drying them in sunlight during the day. Modern freeze-drying had a major turning point during World War 2 when chemically stable blood plasma and penicillin were transported without refrigeration.

### Fruits & Vegetables

Freeze drying is now used with the main



purpose of increasing the shelf life of food products. The shelf life of fresh produce is limited due to high water content and seasonal availability. Freeze drying is a promising technique for drying thermally sensitive products. It is mostly used on high-value products like seasonal fruits, vegetables, and coffee due to its high cost.

Vegetables are essential for human nutrition and are often dehydrated for long-term consumption. Vegetables, such as asparagus, carrot, pumpkin, and tomato are often used in manufacturing

formulated foods such as soups, noodles, breads, and cakes. Freeze-dried vegetables like tomatoes, and carrots, exhibit better nutrient and aroma retention, higher phenolic content, and higher rehydration ratio.

Fresh foods are difficult to dehydrate due to their high moisture levels. Fruits like strawberries, blackberries, guava, and pineapple have been freeze-dried successfully without causing

major damage and retaining their original properties. Compared to other drying techniques, freeze-dried guava has

produced better quality, retaining 63% vitamin C.

Delicate fruits with waxy impermeable skin, are challenging to dehydrate such as Sea buckthorn berries, yet when freeze-dried it retained 93% more carotenoids, 34% more vitamin C, and 11% more phenolics than Hot air drying. When banana powders made using different drying methods were compared for their ability to encapsulate aroma, freeze-dried powder showed the best aroma (3,6,7).



### Spices

Freeze drying method has been used to dehydrate spices like garlic and ginger. Freeze-dried garlic powder has better quality with better retention of allicin content. Ginger, a common condiment, also shows a high retention of gingerols, phenolic content, flavonoids, antioxidant activities, and volatile compounds (7).

### Meat, Poultry & Seafood

Meat and poultry products are highly perishable due to their high nutrient content and potential for microbial contamination, leading to severe foodborne illness. Studies have shown that vacuum freeze-dried meat has a brighter colour, higher nutritional value, and is easy to digest.





roasted ground beans. A highly concentrated liquor is obtained with about 15-30% concentration of coffee solids. After removing the insoluble material, the

year when it is successfully dried, packaged, and kept in optimal storage conditions. Low processing temperatures combined with quick water sublimation leads to an extended shelf life.

Some industries now produce high-grade meat products with rich nutrition using freeze-drying technology. Combining ozone and freeze drying can enhance and extend the shelf life of raw chicken breast meat up to 8 months at 21°C. Freeze drying has also been used to improve the solubility, emulsion stability, and water-holding capacity of egg white protein.

liquid is frozen to -40°C forming a layer that is broken to tiny pieces and loaded into freeze dryer. There are batch plants making up to 7,000 kg powder per day while continuous can make up to 25,000 kg per day (10).



Fish is a crucial dietary component, freeze drying technology can convert hydrated protein into powder without altering its gelling property. Freeze drying has been evaluated for other seafood products, such as brown seaweed pigment, which can be stored at 28°C for 63 days before degradation (6).

### Limitations vs Advantages

When it comes to dehydrating food, freeze-drying is thought to be the best. It preserves the food's quality such as aroma, rehydration, and bioactivity significantly better than other methods. It increases the shelf life of the food significantly. The food has a shelf life of more than a

Deterioration reactions, such as enzymatic browning, nonenzymic browning, and protein denaturation, are reduced under these processing conditions. This enables to retain the colour, shape and nutrients of the product. The food completely rehydrates if the final freeze-dried product is porous. This indicates that the product is of higher quality and is therefore perfect for ready-to-eat instant meals.

### Coffee

Freeze drying is used to produce instant coffee. Beans are roasted, ground and extracted by hot water to prepare a decoction that contains all coffee flavour, aroma and colour from the







Freeze-dried strawberry slices



Rehydrated strawberry slices



Freeze-dried Punjabi Chhole



Reconstituted Punjabi Chhole

In India, a wide range of ready-to-eat traditional dishes, from poha to pulao, are available. These dishes take three to five minutes to prepare on the stove, in the microwave, or simply by adding boiling water. Fruits and vegetables are also available of very high quality with respect to colour, flavour and nutrient contents.

However, it is best suited for products whose value increases with processing

because it is quite expensive than conventional drying. Expenses also depend on the nature of the good, the packing material, the level of processing, etc. Low-temperature dehydration in freeze drying can inhibit microbial growth, but it can still allow spoilage organisms and pathogens to remain in the product. Incorrect packaging or storage can allow these pathogens to reproduce (3).

### Conclusion

The global freeze-dried foods market, valued at approximately USD 13 billion in 2020, is expected to grow at an 8.5% CAGR from 2021 to 2028. The market is expected to expand due to shifting consumer preferences, increasing

disposable income, and demand for ready-to-cook frozen meals. Europe leads the market, followed by North America and Asia Pacific, with Asia Pacific emerging as the fastest-growing due to rising employment, urbanization, and supermarkets.

The market for freeze-dried foods worldwide is divided into segments like freeze-

dried fruits namely melons, berries, mango, and kiwi; freeze-dried vegetables like peas, mushrooms, carrots, beans and corn and freeze-dried poultry like freeze-dried meat and seafood.

In 2020, the freeze-dried vegetables segment accounted for 40.39% of global consumption, with consumers primarily purchasing potatoes, peas, corn, mushrooms, and spinach.



applications will expand with more research, making it important in both commercial industries and home kitchens alike (8).

The primary sources of the demand for frozen vegetables are food courts, hotels, and restaurants, among others. Over 35% of the population of Asia-Pacific resides in India and China, however, freeze-dried food consumption is low due to socio-economic factors, cultural differences, and limited variety. China dominates the market, followed by India and Japan. India along with other Asian countries is expected to experience rapid growth due to increased shops, supermarkets, western lifestyle adoption, disposable income, and urbanization.

In conclusion, freeze drying is an efficient method for preserving food, extending shelf life, and maintaining nutritional value. Its

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# WEBINAR ON BUILDING A HEALTHIER FUTURE: SMART & AFFORDABLE NUTRITION

Protein Foods & Nutrition Development Association of India (PFNDAI) organized a Webinar on 'Building a Healthier Future: Smart & Affordable Nutrition' on 14th August 2024. The webinar was part of the Nutritional Awareness Activity (NAA) held in collaboration with Avinashilingam University, Coimbatore. **Dabur India Pvt. Ltd.**, **Marico Ltd.**, and **Nutricircle Ltd.** sponsored the event.

The welcome address of the webinar was given by **Dr. Shashank Bhalkar**, Executive Director at PFNDAI. He welcomed all, thanked the sponsors, and stated that a well-balanced diet is necessary for individuals to have proper nutrition. To address the issue of malnutrition in India, the Government has introduced various programs. Industries too are developing



**AUTHOR**  
**Ms. Sanyukta Telange,**  
Food Technologist &  
Regulatory Support, PFNDAI



supplements and fortifying products to address it. He further appreciated the tremendous response to the contests of the NAA. He thanked the judges and Avinashilingam University for their time and effort invested during the contests.

**Dr. Bharathi Ravishankar**, Vice Chancellor, of Avinashilingam University delivered the presidential address. She emphasized the value of nutrition and its need to be accessible, inexpensive, and inclusive to all. She further highlighted that Avinashilingam University have had flagship programs to create awareness on nutrition.



**Ms. Sanyukta Telange,**  
Food technologist &



Regulatory support at PFNDAI introduced the speakers for the session, briefly explaining their background, qualifications, and expertise.

**Dr. Prashant Verma,**  
New Product Development, Dabur India Pvt. Ltd.



presented on the topic 'Current trends in fortified foods and beverages.'

He explained fortification and why it is required. According to the National Family Health Survey (NFHS-4), the Indian population is burdened with Vitamin A, Iodine, and Folic acid deficiencies.

He listed the causes of nutrient deficiencies that lead to malnutrition. Food fortification dates back to the 1920s when Europe and North America were the first to iodize salt and it is now the most widely accepted fortified food across the globe. He elaborated on types of food fortification namely Mass fortification, Targeted fortification, and Market driven fortification. FSSAI has introduced regulations and a logo for fortified foods. It has mandated milk and oil fortification with Vitamin A & D along with staple foods like wheat, maida, and rice. Fortification of cereal products, bakery products as well as fruit juices is also mandated. The COVID-19 pandemic has impacted the food and beverage market, leading to fortified products for immunity and energy. New trends focus on bone and joint health, gut health, and healthy breakfast cereals and drinks.

**Mr. Mayank Kumar**, Deputy General Manager-R&D, Mother Dairy Fruit and Vegetable



Pvt. Ltd. presented on the topic of 'Dairy throughout life stages'. He highlighted the importance of dairy products in human diets, their nutritional composition, and their significance across various life stages. Milk is a complex product containing essential nutrients such as fat, proteins, carbohydrates, minerals, and vitamins. He provided a breakdown of cow, buffalo, goat, sheep, and human milk, listing their composition and nutritional value. Dairy has a cultural significance in Indian diets, with common dairy products like milk, curd, paneer, lassi, butter, and ghee consumed almost every day. He stated the importance of consuming dairy in moderation, addressed common concerns about dairy, such as lactose intolerance and milk allergy, and suggested consuming lactose-free products or using dairy-free alternatives. Dr. Mayank concluded by stating, dairy is a delicious and affordable way to obtain necessary nutrients and prevent diseases.

**Dr. Govindarajan**, Chief Innovative Officer, Kapiva Ayurveda, gave the talk on 'Hurdles in maintaining Balanced Diet



and the Role of Nutritional Supplements'. He started by discussing the balanced diet and current nutrition scenario of India. Undernutrition, obesity, hypertension, and diabetes are also prevalent among Indians. He used a graph to illustrate India's current dietary intake contrasts with its ideal intake. The deficiencies lead to the global burden of diseases related to the diet. He stated the hurdles in maintaining a balanced diet like sedentary lifestyle, increased stress levels, work demands, and lack of time. He discussed macronutrient and micronutrient deficiencies in urban and rural populations, dietary guidelines, and the food pyramid. Supplements are not drugs, nor do they cure diseases. He emphasized that supplements should be consumed alongside regular diets, not as a replacement. They come in various packaging, sizes, and types, and are not safe for everyone. Self-prescription is not advised for vulnerable populations like older people, pregnant women, and people with disabilities. Dr. Govindarajan concluded by emphasizing the importance of a balanced diet and supplementation when necessary.

After every presentation, Dr. Bhalkar coordinated the questions raised by the attendees. The speakers enthusiastically answered the questions raised.

Dr. S. Amsamani, Dean School of Home Science delivered the greetings. She thanked PFNDAI for the collaboration and appreciated the students for their active participation and innovative ideas. The winners of the recipe competition and product development competition as part of the Nutrition awareness activity were announced by Dr. S. Amsamani and Dr. C.A. Kalpana, Deputy Dean, School of Home Science, Prof. & Dept. of Food Science and Nutrition, Avinashilingam University.

The judges for the recipe competition were Ms. Meenu Yadav from Marico Ltd and Dr. Deepa Sathish, HOD of

PSGR Krishnakamal College.



Mr. C. S. Jadhav



Ms. Keerthana

The judges for product development were Mr. C. S. Jadhav from Nutricircle Ltd and Ms. Keerthana from Arya Vaidya Pharmacy, Coimbatore.

Dr. Jagdish Pai, Editor at PFNDAI, and Dr. Prabodh Halde Head-Regulatory Affairs, Marico Ltd. interacted with students. Dr. Pai congratulated all the winners. Earlier, nutrition had a smaller role in food product development.

Nowadays nutritionists are required in the food industry as processors need to maintain the nutritional quality of food. He advised students to participate in events, reach out to the experts, visit the factories, and do internships. Dr. Halde addressed the students by saying food is an essential part of the daily routine.



Dr. S. Amsamani



Dr. C.A. Kalpana



Ms. Meenu Yadav



Dr. Deepa Sathish

Students have a huge scope to enter the food industry. They need dedication, determination, and discipline.

At the end of the session, Dr. P. A. Raajeswari, Prof. Dept of Food Science & Nutrition, Avinashilingam University gave a vote of thanks on behalf of Avinashilingam University.



Dr. P.A. Raajeswari

Ms. Samreen Shaikh, Jr. food technologist at PFNDAI gave a vote of thanks to the webinar sponsor, speakers, and judges along with her PFNDAI team members for making the webinar a success. She also thanked the attendees for patiently attending the webinar.



Ms. Samreen Shaikh

The entire webinar recording is available on the following link:  
<https://fb.watch/uc7jRH0575/>



# REGULATORY ROUND UP



AUTHOR

**Dr Shashank Bhalkar,**  
Executive Director, PFNDAI  
[executivedirector@pfndai.org](mailto:executivedirector@pfndai.org)

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

[Clarification regarding Selling/Marketing of fruit juices with Non-standardized ingredients](#): This order is about FBOs adding non-standardised ingredients such as. "Deionised apple juice concentrate" in their fruit juices. The ingredient is not permitted under FSSAI regulation and therefore needs approval under FSS (Approval for non-specific and food ingredients) regulations 2017. The label claims must comply with FSS (Advertisements and Claims) Regulations 2018 and FSS (L&D) Regulations 2020.

[Extension of Enrolment of Non Food Production \(NFP\) Units for Collection of Used Cooking Oil from Food Business](#)

[Operator](#): The validity of authorization of NFP units, collecting used cooking oil from food business operators for converting in to biodiesel, etc., has been extended to 31.07.24. The annexure lists the NFPs. The NFPs are bound by SOPs, guidelines issued by Food authorities.

[Directions under Section 16\(5\) of Food Safety and Standards Act, 2006 regarding disposal of Used Cooking Oil \(UCO\)](#): There have been flip flops in permitting topping of edible oil during processing with fresh edible oil to maintain the Total Polar Matter (TPM) below the limit of 25%. Vide the present order, this provision has been withdrawn. In other words, now, it is not permitted to top up used oil with fresh oil to maintain the upper limit of 25% TPM.

[Selling/Marketing of](#)

[reconstituted fruit juices as "100% Fruit Juices"](#): This is in continuation of a previous order which prohibited the claim "100% juice" in products with fruit juice concentrate as the ingredient. FSSAI, in recognition of the fact that FBOs would be carrying pre-printed packaging material inventory with a "100% juice" claim, has permitted the use of existing packaging material till 31 December 2024.

[Sensitization of Food Testing Laboratories mapped on FICS portal](#): Some Food testing Laboratories responsible for testing import samples which are mapped on the Food Import Control System (FOCS) commit inadvertent mistakes while uploading the reports. The present advisory is to sensitise the laboratories to be careful while uploading the reports. Various parameters including time to generate and upload the reports, proper test results etc., are given in this advisory.

## A1 and A2 Milk

Considerable claims and counter claims have been made about A 1 and A2 milk and the associated benefits. FSSAI in its [order dated 21 August 2024](#) prohibited the claims with regard to A2 milk and ghee derived from such milk as such differentiation is not recognized under Food Standard and Safety regulations. Further, the order instructed the FBOs to remove such claims from the milk. However, FSSAI vide its [order dated 26 August 2024](#) withdraws the previous order banning the claims about A2 milk and its products. Now it is *status quo ante*

[Revised list of FSSAI notified laboratories for testing of fortificants in Fortified Rice \(FR\), Fortified Rice Kernel \(FRK\) and Vitamin-Mineral Premix for Fortified Rice Kernel](#): The order gives the list of approved accredited laboratories that can carry out the testing of different fortificants in FR, FRK and Vitamin Mineral premix for FRK.

[Draft Notification of Food Safety and Standards \(Food Products Standards and Food Additives\) Amendment Regulations, 2024 \(uploaded on 27.08.2024\)](#): This draft notification called FSS(Food Products Standard and Food Additives) Regulations 2011 is for the use of Natamycin in certain categories Chakka (1.2.1.2) and Dairy based Desserts (1.7). Earlier no additive was permitted in these products. Any objections or suggestions should be given in sixty days from 21.08.2024.

[Direction under Section 16\(5\) of Food Safety and Standards Act, 2006 regarding re-operationalisation of draft FSS \(Labelling and Display\) Amendment Regulations 2022](#): FSS (L&D) Amendment Regulations related to Labelling Requirements of the non-retail container, minimally processed food, warning statement related to pan masala etc. were operationalised dated 17.06.2022 and re-operationalised several times till 05.06.2024. Food authority has approved the final amendments except for



provisions related to the tolerance limit. Therefore, the provisions approved in June 2024 are to be re-operationalised (except for the tolerance limit of +/- 20% of the declared nutrients) from 01.07.2024.

[Direction under Section 16\(5\) of FSS Act, 2006 regarding re-operationalisation of draft FSS \(Health Supplements, Nutraceuticals, FSDU, FSMP and Prebiotic and Probiotic Food\) Regulations, 2022](#): FSSAI published FSS (Nutra) Regulation as an order and operationalised it from March 2022. Subsequently, the order was notified as a draft notification inviting comments from the stakeholders. As it is taking time to issue the final notification, the draft is re-operationalised with effect from 01.07.2024.



# RESEARCH IN HEALTH & NUTRITION



## Should you eat more dietary fibre? New study says it depends

June 25, 2024 Science Daily

The results showed that individuals with a higher diversity of gut microbiota responded better to a specific type of resistant starch, while those with lower diversity did not experience the same benefits.

This suggests that a one-size-fits-all approach to dietary

fibre recommendations may not be the most effective way to promote health and well-being.

The implications of these findings are significant, as they highlight the importance of personalized nutrition recommendations based on an individual's unique gut microbiome composition. By

understanding how certain dietary fibres interact with specific gut microbes, nutritionists can provide more tailored advice to help maximize the health benefits for each person.

This research opens up new avenues for developing personalized nutrition plans that take into account the individual variations in gut microbiota, ultimately leading to better outcomes for overall health and wellness.

Devarakonda et al. Gut microbial features and dietary fibre intake predict gut microbiota response to resistant starch supplementation. *Gut Microbes*, 2024; 16 (1) DOI: [10.1080/19490976.2024.2367301](https://doi.org/10.1080/19490976.2024.2367301)

## Proteins and fats can drive insulin production for some, paving way for tailored nutrition

July 2, 2024 Science Daily

This groundbreaking research from the University of British Columbia highlights the importance of considering proteins and fats, in addition to carbohydrates, when managing blood sugar levels.

The study, published in *Cell Metabolism*, shows that insulin production in response to different macronutrients varies greatly among individuals.

Some people have a strong response to proteins, while others are more responsive to fats. This discovery opens the door to personalized nutrition strategies that could revolutionize how we approach conditions like diabetes, obesity, and even certain forms of cancer.

The findings also have implications for individuals with Type 2 diabetes. While their insulin response to glucose may be low, the research showed that their response to proteins remains largely intact. This suggests that protein-rich diets could have therapeutic benefits for diabetes patients. By understanding the individual factors that drive insulin

production, healthcare providers may be able to offer tailored dietary guidance that helps individuals better manage their blood sugar and insulin levels. Additionally, the researchers hope that genetic testing could one day be used to determine which macronutrients are most likely to stimulate an individual's insulin response, leading to more targeted and effective dietary interventions.

Kolic et al. Proteomic predictors of individualized nutrient-specific insulin secretion in health and disease. *Cell Metabolism*, 2024; 36 (7): 1619 DOI: [10.1016/j.cmet.2024.06.001](https://doi.org/10.1016/j.cmet.2024.06.001)

The discovery of the TRPC5 gene and its role in obesity, behavioural problems, and postnatal depression sheds light on the complex interplay

between genetics and mental health.

The study's findings offer new insights into the

## Oxytocin as possible treatment for obesity and postnatal depression

July 2, 2024 Science Daily

PFNDAI Sep 2024



biological mechanisms underlying these conditions, revealing the crucial role that oxytocin plays in regulating key behaviours such as appetite, social interaction, and maternal care.

The identification of the TRPC5 gene as a genetic factor contributing to obesity and postnatal depression also opens up new possibilities for

targeted treatments. By restoring the function of oxytocin neurons affected by the defective gene, researchers hope to alleviate symptoms and improve outcomes for individuals with TRPC5 deficiencies, as well as mothers experiencing postnatal depression. This research underscores the importance of understanding the biological basis of mental health

conditions and highlights the potential of targeted interventions to address these complex and debilitating disorders.

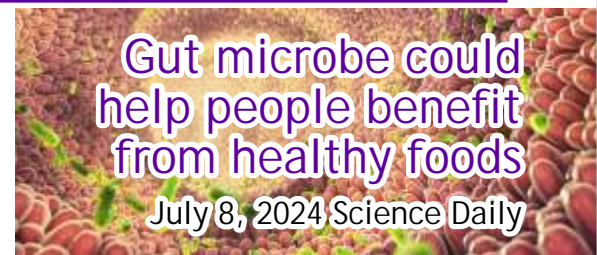
Li et al. Loss of transient receptor potential channel 5 causes obesity and postpartum depression. *Cell*, 2024; DOI: [10.1016/j.cell.2024.06.001](https://doi.org/10.1016/j.cell.2024.06.001)

The findings of this study challenge the traditional view of Blastocystis as a harmful parasite and suggest that it may actually play a beneficial role in human health.

The association between gut Blastocystis and indicators of good cardiovascular health and decreased body fat highlight the potential positive impact this single-celled organism may have on overall well-being. The research underscores the importance of understanding the complex interactions between gut microbiota, diet, and cardiometabolic health.

The study's focus on individuals from diverse regions around the

world provides a global perspective on the relationship between gut Blastocystis and nutrition. The observation that Blastocystis levels are influenced by diet and are associated with the intake of healthful plant-based and minimally processed foods suggests a potential symbiotic relationship between the organism and its host. The link between higher Blastocystis levels and better short-term cardiometabolic health outcomes, as well as the association with improvements in diet quality following a personalized diet intervention, further supports the idea that this organism may play a beneficial role in modulating



human health. Overall, this research opens up new avenues for studying the complex interactions between gut microbiota and human health.

Piperni et al. Intestinal Blastocystis is linked to healthier diets and more favourable cardiometabolic outcomes in 56,989 individuals from 32 countries. *Cell*, 2024; DOI: [10.1016/j.cell.2024.06.018](https://doi.org/10.1016/j.cell.2024.06.018)



suffer from this condition.

The study conducted by the University of Michigan not only identified the efficacy of inulin gel in preventing severe allergic reactions in mice, but also highlighted the importance of targeting gut bacteria as a key factor in addressing the root cause of food allergies. By normalizing imbalanced intestinal microbiota and metabolites, the inulin gel was able to establish allergen-specific oral tolerance, effectively suppressing allergic reactions to common food

allergens.

The safety profile and potential for large-scale production of inulin gel-based therapy make it a feasible and translatable option for clinical use, offering long-lasting protection even after the cessation of treatment.

While further research and clinical trials are needed to validate these findings, the study opens up new avenues for therapeutic interventions that could provide sustained relief from food allergies.

The potential for inulin gel-based oral immunotherapy to revolutionize the treatment of food allergies is a groundbreaking development that offers hope to the millions of individuals worldwide who

This groundbreaking research not only has the potential to transform the way food allergies are treated, but also sheds light on the broader

applications of inulin in treating various diseases and conditions. Han et al. Inulin-gel-based oral immunotherapy remodels the

small intestinal microbiome and suppresses food allergy. *Nature Materials*, 2024; DOI: [10.1038/s41563-024-01909-w](https://doi.org/10.1038/s41563-024-01909-w)

## Greater attention needed to malnutrition in sick and elderly

Malnutrition is a serious issue that affects a significant portion of the population, particularly among older adults and hospital patients.

The consequences of malnutrition can be devastating, leading to unnecessary suffering, poorer quality of life, and even mortality. Despite the availability of simple measures to diagnose and treat malnutrition, it remains underdiagnosed and

undertreated in healthcare settings around the world.

People suffering from malnutrition will lose weight and the lack of nutrients may lead to muscle atrophy, making it difficult to cope with everyday life. They may also be more susceptible to infection and require more care, possibly involving long periods of hospitalisation and increased mortality.

Researchers from Uppsala University and the University of Gothenburg are calling for greater attention to be paid to the issue of malnutrition in order to alleviate the suffering of patients and improve their overall well-being. By

implementing basic nutritional interventions, such as recommending nutrient-dense foods and offering nutritional therapy, healthcare professionals can make a significant impact on the health outcomes of individuals at risk of malnutrition. It is crucial that this knowledge becomes a more explicit component of both basic and specialist training for medical professionals in order to ensure that patients receive the care they need to prevent and treat malnutrition effectively.

Cederholm&Bosaeus. Malnutrition in Adults. *New England Journal of Medicine*, 2024; 391 (2): 155 DOI: <https://www.nutritioninsight.com/ne>

## Widespread practice among athletes, harms both performance and health

July 15, 2024 Science Daily

Achieving the 'right' weight for competition has long been a focal point for elite athletes in various sports.

Whether it's to fit into a certain weight category or to improve performance, many athletes, especially in endurance sports, have a tendency to reduce their dietary intake leading up to competitions. However, research conducted by Professor Ylva Hellsten and PhD student Jan Sommer Jeppesen at the University of Copenhagen sheds light on the harmful effects of low energy

availability among female athletes.

Their study on twelve female triathletes revealed that a 14-day period of insufficient food intake led to a 7.7% reduction in performance during a 20-minute time trial on a bike, as well as an 18% decrease in performance during a more intense short-term test. Additionally, the athletes experienced a loss of muscle mass and a weakened immune system, indicated by increases in cortisol levels and stress in immune cells. The researchers hope that these findings will raise awareness about the negative consequences of not eating enough, especially within the sports community.

Team Denmark, the Danish elite sport organization, plans to integrate these research results

into their programs to educate athletes and coaches about the dangers of excessive weight-loss practices. It was noted that men tend to be more resilient to insufficient energy intake compared to women, due to the drastic drop in estrogen levels that can occur in women, leading to long-term physiological effects. This study emphasizes the importance of maintaining a healthy and balanced diet for optimal sports performance and overall well-being.

Jeppesen et al. Low energy availability increases immune cell formation of reactive oxygen species and impairs exercise performance in female endurance athletes. *Redox Biology*, 2024; 75: 103250 DOI: [10.1016/j.redox.2024.103250](https://doi.org/10.1016/j.redox.2024.103250)

The International Osteoporosis Foundation (IOF) Vitamin D Working Group's new position paper sheds light on the global burden of vitamin D deficiency and emphasizes the importance of public health approaches to its prevention.

With variations in vitamin D concentrations worldwide and challenges in testing methods, guidelines, and supplementation, the paper highlights the need for tailored interventions based on population characteristics such as diet, lifestyle, and environmental factors. The researchers stress the significance of maintaining optimal vitamin D levels

through strategies like daily supplementation and food fortification, taking into account individual needs and potential risks associated with deficiency.

While vitamin D screening may not be necessary for the general population, high-risk groups such as seniors and individuals with pigmented skin living in northern latitudes may benefit from testing and tailored interventions. The researchers caution against excessive doses of vitamin D and emphasize the importance of individualized approaches to repletion in cases of deficiency. By standardizing measures and promoting guidelines focused



## Burden of vitamin D deficiency

17 Jun 2024 Nutrition Insight

on optimizing vitamin D status in populations globally, the paper provides valuable insights for healthcare professionals, policymakers, and researchers working towards improved public health outcomes related to vitamin D deficiency.

<https://www.nutritioninsight.com/news/burden-of-vitamin-d-deficiency-outlined-in-international-osteoporosis-foundation-position-paper.html>



## Power of dietary fibres to balance healthy or harmful substances in gut

26 Jun 2024 Nutrition Insight

The findings from the research conducted by scientists at DTU National Food Institute and the University of Copenhagen shed light on the intricate relationship between dietary fibres, gut bacteria, and tryptophan metabolism.

The study highlights the importance of consuming a diet rich in fruits, vegetables, and whole grains to promote the healthy conversion of tryptophan into beneficial substances by gut bacteria. By understanding how dietary habits influence the behaviour of gut bacteria, researchers can develop more targeted dietary programs to prevent various diseases.

The battle over tryptophan in the colon and the competition between different types of gut bacteria underscore the importance of maintaining a balanced diet rich in fibre. The

research not only emphasizes the significance of dietary fibres in promoting good health but also provides insight into how dietary choices can impact gut microbiome composition and function. By focusing on modifying the behaviours of gut bacteria through dietary interventions, scientists hope to improve our understanding of how diet influences gut health and overall well-being. These findings open up new possibilities for developing personalized dietary recommendations to optimize gut health and prevent chronic diseases.

<https://www.nutritioninsight.com/news/research-reveals-power-of-dietary-fibers-to-balance-healthy-or-harmful-substances-in-gut.html>



## Whole wheat maintains more nutrients than refined flour during processing

02 Jul 2024 Food Ingredients First

The findings of this study provide valuable insight into the nutritional benefits of

whole grains compared to refined grains, particularly in terms of major and trace minerals as well as important vitamins like E and carotenoids.

By tracking the nutrient content of wheat from farm to table, researchers are able to better understand how processing methods can impact the overall nutritional value of

food products. These findings further support the recommendations of dietary guidelines to include more whole grains in a healthy diet.

The ongoing research on wheat processing and baking techniques aims to highlight the importance of promoting whole grain consumption to improve overall health and nutrition.

By uncovering the significant differences in nutrient content between whole wheat products and refined white flour products, scientists hope to encourage consumers to make more informed decisions about the foods they eat. Moving

forward, researchers plan to explore how farming and processing practices can influence the nutrient density of wheat products, with a focus on preserving vitamins like A and E through fermentation and other techniques. Ultimately, a

diet rich in whole grains can have a positive impact on overall health and well-being. <https://www.foodingredientsfirst.com/news/whole-wheat-maintains-more-nutrients-than-refined-flour-during-processing-research-flags.html>

## Price problems: British Nutrition Foundation reveals barriers to healthy food choices

10 Jun 2024 Food Ingredients First

The British Nutrition Foundation's Healthy Eating Week initiative is a crucial step in promoting better nutrition for children, especially in light of the findings from their recent survey.

The high cost of healthy foods can often deter parents from providing nutritious meals for

their children, but initiatives like "Veggie Victory" aim to make it more accessible and affordable. With simple and inexpensive options like carrots, beetroot, and frozen vegetables, parents can easily incorporate more vegetables into their children's diets, laying the foundation for healthier eating habits.

The BNF's focus on educating both parents and children about the importance of vegetables and healthy eating is commendable. By providing resources like reward charts, recipes, and information on budget-friendly options, the

foundation is empowering families to make positive changes in their diet. Additionally, collaborations with organizations like Magic Breakfast and efforts to raise awareness about vitamin D guidelines demonstrate a holistic approach to child nutrition. With initiatives like Healthy Eating Week and resources like the food roadmap, the BNF is making strides towards improving the health and well-being of children across the UK. <https://www.foodingredientsfirst.com/news/price-problems-british-nutrition-foundation-reveals-barriers-to-healthy-food-choices.html>

## Baking a Difference

By Miranda Grizio May 31, 2024

By empowering Rwandan women with job skills and providing nutritious protein-packed bread to schoolchildren, The Women's Bakery (TWB), a social enterprise in Rwanda, is making a significant impact on the community.

The social enterprise not only addresses the issue of chronic malnutrition in children but also supports women in gaining financial independence and contributing to their families' well-being.

Through their innovative training program and commitment to producing highly nutritious bakery products, TWB is demonstrating the potential for social enterprises

to create lasting change in developing countries. By focusing on both economic empowerment and community nutrition, the organization is addressing multiple challenges facing Rwandan society and paving the way for a brighter future for all involved.

<https://www.ift.org/news-and-publications/food-technology-magazine/issues/2024/june/columns/food-security-baking-a-difference>

## Supplementation with a blend of botanical extracts found to increase muscle strength and endurance post-resistance training

By Hui Ling Dang  
29-May-2024 - NutraIngredients

The study highlights the potential benefits of daily supplementation with an extracts blend derived from East Indian globe thistle and mango tree bark in enhancing muscle adaptive responses to resistance exercise training (RET) in men.

The findings suggest that *Sphaeranthus indicus* and *Mangifera indica* extracts may have immunomodulatory, antioxidant, and anti-inflammatory properties that contribute to improved muscle strength, endurance, and testosterone levels in male participants.

Moreover, the study indicates that the *S. indicus* and *M. indica* extract blend may be well-tolerated and effective in accentuating muscle adaptation when incorporated into an eight-week RET program. The results not only demonstrate the significance of dietary supplementation in enhancing muscle responses to exercise but also suggest the potential benefits of utilizing plant-based products to support RET

outcomes in a broader population, including individuals seeking to boost muscle growth and improve overall health and functionality.

Overall, the research highlights the promising role of *S. indicus* and *M. indica* extracts in optimizing muscle adaptive responses to resistance exercise training in men. Further studies are warranted to explore the effects of these extracts on

muscle adaptation in different populations, such as women and older adults, to better understand their potential benefits in promoting muscle strength, functionality, and overall health outcomes.

<https://doi.org/10.3389/fnut.2024.1393917>

<https://www.nutraingredients.com/Article/2024/05/29/gnc-funded-study-finds-supplementation-of-botanical-extracts-blend-could-increase-muscle-strength>

## New data drives home cognitive benefits of ashwagandha

By Nikki Hancocks  
11-Jun-2024 - NutraIngredients

Specnova's Noogandha ashwagandha ingredient has shown great promise in improving cognitive function, mood, and overall health in healthy individuals.

The recent study conducted by Specnova in collaboration with Increnovo LLC revealed that ashwagandha supplementation could enhance short-term memory, attention, vigilance,

and reaction times in men and women under the age of 50. The study also highlighted the potential benefits of ashwagandha in reducing stress markers and improving cognitive function in individuals with perceived stress.

The research conducted by a team of experts from Texas A&M University, University of Wisconsin, and Increnovo LLC demonstrated that ashwagandha could have a positive impact on various cognitive function tests, mood states, and markers of health and safety. The study indicated that ashwagandha supplementation could lead to improvements in word recall,

choice reaction time, picture recognition, digit vigilance, and mood states. The researchers also discussed various mechanisms through which ashwagandha may influence cognition, including its adaptogenic properties, neuroprotective effects, influence on neurotransmission, and reduction of oxidative stress and inflammation. Overall, the findings suggest that ashwagandha could be a valuable ingredient for improving cognitive performance and mood in individuals of all ages.

doi:10.3390/nu16121813

<https://www.nutraingredients.com/Article/2024/06/11/New-data-drives-home-cognitive-benefits-of-Noogandha>

## Antioxidant-rich supplement may boost memory:RCT

By Stephen Daniells  
10-Jun-2024 - NutraIngredients

This study provides valuable insights into the potential cognitive benefits of a supplement containing vitamin E, astaxanthin, and grape juice extract.

The improvements in episodic

memory and the increase in plasma BDNF suggest that this nutraceutical may have protective effects on cognitive health, particularly in middle-aged individuals with subjective memory complaints. The significant decrease in MDA levels also indicates potential antioxidant effects, reducing oxidative stress in the brain. The findings from this research highlight the importance of incorporating nutrient-rich supplements into daily routines to support cognitive function and overall brain health. Future

trials should aim to confirm these promising results and explore additional mechanisms of action to further understand the potential benefits of this supplement. With further research and validation, this nutraceutical may offer a natural and effective way to support cognitive health and enhance memory function. *Nutrients* 2024, 16(11), 1770; doi: 10.3390/nu16111770 <https://www.nutraingredients.com/Article/2024/06/10/Antioxidant-rich-supplement-may-boost-memory-RCT>

# FOOD SCIENCE & INDUSTRY NEWS

## Opportunities for science-backed and tasty nutrition ingredients

05 Jun 2024 Nutrition Insight

Consumers are increasingly seeking functional ingredients in convenient and indulgent formats that have a "good for you" value.

As the trend of "foodie formats" continues to rise, scientific research remains crucial in the success of these functional

Infant nutrition brands are constantly innovating to create products that closely mimic human breast milk, incorporating key ingredients such as HMOs, probiotics, and bio-actives to support infant health and development.

The industry is focused on narrowing the compositional differences between breast milk and infant formula to optimize health outcomes for infants, particularly those with specialized dietary needs like hypoallergenic formulas. Ingredients such as cow's milk fat, MFGM, OPO, and HMOs are gaining popularity for their role in supporting gut well-being,

As children grow and develop, it is crucial to provide them with the necessary nutrients to support their brain health and cognitive function.

Brainiac Foods' new range of fruit snacks is designed to

foods. However, key players such as DoLCas Biotech, Arla Foods Ingredients, and Givaudan emphasize that taste is becoming increasingly important in these products. Dr. Shavon

Jackson-Michel of DoLCas Biotech notes a growing demand for functional ingredients in various food and beverage formats, moving beyond traditional capsules and tablets.

Troels Nørgaard Laursen of Arla Foods Ingredients highlights the

cognitive development, and immune function in infants.

Industry leaders like dsm-firmenich, Valio, FrieslandCampina Ingredients, AB-Biotics, and Lubrizol Life Science are at the forefront of infant nutrition innovation, working towards providing solutions for infants with special nutritional needs and formulating products that support a healthy microbiome. The expanding ingredient toolbox, combining HMOs, hypoallergenic formulas, and lactose-free options are part of the efforts to create infant nutrition products that are not only nutritious but also

do just that, offering a delicious and convenient way for kids to get the omega-3s, choline, and lutein they need to fuel their brains. With flavours like sour apple, berry blast, and tropical tango, these snacks are sure to be a hit with little ones while also providing

importance of taste, convenience, and new formats in these functional products. He notes that trends in taste and flavour are here to stay, and the company is focusing on bringing nutrition in compact formats that still deliver on taste. Additionally, companies must determine key characteristics that new consumer groups may be looking for, such as active nutrition and lifestyle consumers. The blending of taste, convenience, and nutritional benefits is crucial in the development of these products.

<https://www.nutritioninsight.com/news/functional-food-formats-opportunities-for-science-backed-and-tasty-nutrition-ingredients.html>

## Infant nutrition offerings to optimize gut and immune health

06 Jun 2024 Nutrition Insight

palatable and stable. As research on the infant microbiome and the role of probiotics in infant health advances, companies are developing clinically-documented strains tailored for children to restore gut balance, enhance immunity, and support overall health and well-being in infants.

<https://www.nutritioninsight.com/news/spotlight-on-specialized-infant-nutrition-offerings-to-optimize-gut-and-immune-health.html>

## Cognitive health enhancement with novel smart snacks for kids

07 Jun 2024 Nutrition Insight

important nutrients to support their mental fitness.

The research highlighted by Brainiac Foods underscores the important role that diet plays in cognitive function and mental well-being. By choosing smart snacks like Brainiac's fruit snacks, parents can help their children boost their brain

power and support healthy development. With ingredients like omega-3s, choline, and lutein, these snacks go beyond just tasting good - they also offer real benefits for children's brain health. Additionally, new advancements in algae-based DHA powders from FrieslandCampina Ingredients provide even more options for

incorporating brain-boosting nutrients into children's diets, ensuring that they have the best possible start for a lifetime of learning and growth.

<https://www.nutritioninsight.com/news/brainiac-foods-endorses-cognitive-health-enhancement-with-novel-smart-snacks-for-kids.html>

Fooditive's introduction of its 5-keto-D-fructose sweetener showcases the company's commitment to innovation, sustainability, and health.

By utilizing side-streams from apple and pear processing to create a natural sweetener that closely mimics the flavour profile of sugar, Fooditive is providing F&B manufacturers with a viable solution to reduce sugar content in their products without compromising on taste or quality. The company's dedication to meeting the real needs of food producers is reflected in their development of a sweetener that not only offers sweetness but also possesses additional functionalities that make it

easy to use in various applications.

As the debate on the safety and health effects of low- or no-calorie sweeteners continues, Fooditive's Keto-Fructose sweetener offers a natural and sustainable alternative for consumers looking to reduce their sugar intake. By supporting a circular economy and utilizing waste side streams to produce their sweetener, Fooditive is not only minimizing environmental impact but also creating an affordable and accessible product for manufacturers and consumers. As the company partners with F&B companies to introduce their sweetener to a



wider audience, they are paving the way for the development of healthier, sugar-free alternatives that meet consumer demand for more transparent and sustainable food products.

<https://www.nutritioninsight.com/news/fooditive-unveils-healthier-and-more-sustainable-sugar-alternative-with-extraordinary-sweetness.html>

Joint health products are becoming increasingly popular as consumers across all age groups are focusing on optimizing mobility and maintaining an active lifestyle.

With the aging population growing and younger generations looking to support their joints for the long term, the demand for innovative solutions in the joint health market is expanding rapidly. Industry leaders are at the forefront of this trend, providing a diverse array of options for consumers seeking joint health support.

Dairy-based solutions have long been recognized for their benefits in promoting bone and joint health, with Valio offering a range of milk powders enriched with essential nutrients for musculoskeletal support. On the other hand, plant-based ingredients are gaining traction in the joint health space, with products like Atragyl providing a clinically validated solution for joint comfort and flexibility. As the market continues to evolve, the focus is shifting towards hybrid products that combine animal-based and plant-based ingredients to maximize the benefits for consumers of all



ages. With advancements in research and development, joint health solutions are becoming more accessible and effective, catering to a diverse range of consumers looking to maintain their mobility and overall well-being.



Collagen has become a popular ingredient in joint health products due to its ability to support mobility and reduce joint discomfort. Lonza's UC-II undenatured type II collagen has been clinically proven to improve joint functionality and reduce knee discomfort, making it a standout choice for active, healthy adults. Collavant n2 has also shown impressive results in improving joint functionality and comfort, even in healthy individuals.

With the benefits of collagen becoming more widely recognized, it is expected that more joint health supplements will incorporate this key ingredient in the future.

In addition to collagen, sulphur in the form of MSM is another important component for joint health. OptiMSM has been shown to contribute to overall joint and physical function by providing necessary nutrients for cartilage health. The combination of MSM with other joint health ingredients such as collagen and glucosamine can boost effectiveness in promoting joint health. With

continued research and clinical studies highlighting the benefits of sulphur for joint health, it is clear that this ingredient will continue to play a crucial role in improving joint function and overall mobility. As the joint health market continues to grow, innovative solutions like Your Arthro Ease Capsules, which combine collagen, Boswellia extract, MSM, and other key ingredients, will likely become more prevalent in providing comprehensive joint health support.

<https://www.nutritioninsight.com/news/joint-health-market-growth-driven-by-consumer-interest-in-dairy-plant-based-and-collagen-solutions.html>

Consumers in the sports nutrition market are increasingly looking for science-backed solutions that can help them recover from exercise more quickly and effectively than ever before.

This demand for comprehensive results has led to a shift away from traditional bulky bars and chalky shakes, with many consumers now seeking out products that offer convenient formats and a wider variety of options. This trend has also extended beyond just sports nutrition, crossing over into healthy aging, active lifestyle, and active aging segments.

In response to this growing demand, companies like ADM, FrieslandCampina Ingredients, and Rousselot are innovating their products to meet the needs of consumers from all walks of life. From elite athletes to casual active individuals, there is a focus on providing high-quality, convenient, and great-tasting solutions that can easily fit into busy schedules. With a focus on post-workout recovery and muscle support, these companies are utilizing ingredients like collagen, probiotics, and botanical extracts to optimize the



recovery process and support overall well-being. By creating innovative solutions that cater to a broad demographic and offer a range of benefits, these companies are helping consumers achieve their fitness and health goals in a practical and effective way.

<https://www.nutritioninsight.com/news/beyond-the-gym-booming-post-workout-recovery-nutrition-for-active-consumers.html>

As the protein market continues to grow and evolve, it is clear that the demand for alternative protein sources is on the rise.

Consumers are increasingly looking for sustainable and ethical options that offer both nutritional value and taste. Companies like Biospringer by Lesaffre and ADM are at the forefront of this innovation,

offering alternative protein ingredients such as yeast protein and hybrid blends to meet the needs of a diverse consumer base.

The challenges and opportunities in the protein market are vast, with companies facing the task of creating products that are not only delicious and nutritious





By leveraging new technologies and investing in research, companies can continue to push the boundaries of protein innovation and meet the growing demand for alternative options.

Looking ahead, the future of the protein market is bright, with significant growth

expected in the coming years. With new technologies like precision fermentation and cell cultivation on the horizon, the possibilities for protein innovation are endless. By staying ahead of emerging trends and consumer preferences, companies can continue to drive the evolution of the protein market and offer

a wide variety of options to meet the needs of a diverse and health-conscious consumer base.

<https://www.foodingredientsfirst.com/news/protein-developments-innovators-tap-into-yeast-and-plant-based-blends-to-meet-diversifying-demand.html>

## Bioconversion tech to slash sugar and calories in fruit sorbets

24 Jun 2024 | Food Ingredients First

Innovative approach to reducing sugar content in fruit sorbets is an exciting development in the food-tech industry.

By using enzymatic technology to convert simple sugars into non-digestible molecules, the

company is able to significantly cut the sugar content of sorbets without sacrificing flavour or texture. This technology not only meets the growing demand for diet-friendly, low-calorie products, but also addresses the health concerns associated with high sugar intake.

In addition to sorbets, Better Juice is exploring the potential for reduced sugar contents in a variety of food products containing fruit. By targeting fruits such as oranges, apples, berries, and more, the company is looking to

revolutionize the way we consume sweet treats. With consumer trends shifting towards healthier options, Better Juice's technology has the potential to make a significant impact in the confectionery sector. As they continue to expand their product offerings and partnerships, it will be interesting to see how their innovative sugar reduction technology shapes the future of the food industry.

<https://www.foodingredientsfirst.com/news/better-juice-enhances-bioconversion-tech-to-slash-sugar-and-calories-in-fruit-sorbets.html>

As climate change continues to wreak havoc on food systems around the world, it is imperative for F&B innovators to find sustainable alternatives to traditional products.

The rising prices and decreasing production of olive oil in Spain due to drought and extreme heat serve as a stark reminder of the challenges faced by the industry. In response, companies like Algae Cooking Club are pioneering new solutions to mitigate the impact of these changes. The use of microalgae as the

basis for a chef-grade cooking oil is not only a step towards sustainability but also a nod to the potential of fermentation in the culinary world. The high concentration of monounsaturated fats in the algae oil not only makes it a healthier option but also a more stable and versatile choice for cooking. With a lower carbon footprint and a neutral yet buttery flavour profile, this innovative oil is gaining traction in the market and sparking curiosity among consumers and retailers alike. As the world seeks more

## Innovator unlocks fermentation for alternative ingredient amid oil price hikes

21 Jun 2024 | Food Ingredients First

sustainable alternatives to traditional ingredients, products like algae oil are paving the way for a more environmentally friendly future in the F&B industry.

<https://www.foodingredientsfirst.com/news/oil-from-algae-us-innovator-unlocks-fermentation-for-alternative-ingredient-amid-price-hikes.html>

## Multi-fibre complex for tasty nutritional benefits

21 Jun 2024 | Food Ingredients First

Manufacturers can create a wide range of bakery products, from soft bread and rolls to crispy crackers and cookies, without compromising on taste or texture.

The fibres also contribute to the overall health profile of the products, making them a valuable addition to any bakery's offerings. GoodMills Innovation's Snow Prebiotic Fibers

cater to the growing consumer demand for healthier, gut-friendly bakery products without sacrificing taste or quality. By combining seven different fibre sources, the company has created a versatile ingredient that supports gut health while improving the sensory experience of baked goods.

With consumers increasingly aware of the link between fibre and overall well-being, products like Snow Prebiotic Fibers are likely to resonate with health-conscious shoppers looking for convenient ways to boost their fibre intake. This innovative approach to fibre supplementation in bakery

products sets a new standard for the industry, offering a solution to the “fibre gap” while delivering on taste and texture.

<https://www.foodingredientsfirst.com/news/goodmills-innovation-unveils-multi-fiber-complex-for-tasty-nutritional-benefits.html>

## UK authorities approve Reb M stevia from bioconversion

13 Jun 2024 Food Ingredients First

The approval of Ingredion's steviol glycosides produced using the bioconversion method by food safety authorities in the UK is a significant development that will enhance the availability of stevia sweeteners and natural flavour modifiers in the region.

This approval allows F&B manufacturers to access the stevia leaf molecules to elevate the taste and quality of their

products, catering to the growing consumer demand for naturally sourced and clean label ingredients. The bioconversion method employed mimics the natural production process of stevia, resulting in high sweetness quality, a clean taste, and zero calories, making it an attractive option for brands looking to reduce sugar content sustainably.

With consumers increasingly prioritizing health and sustainability in their purchasing decisions, the demand for products with reduced sugar and natural ingredients is on the rise. This trend aligns with commitment to providing innovative solutions that meet the

evolving needs of F&B companies striving for sugar reduction targets. The advancements in technologies like bioconversion enable brands to offer cleaner label products with enhanced sweetness profiles, addressing the growing consumer interest in healthier food and drink options. Overall, the approval of PureCircle's steviol glycosides from bioconversion technology in the UK marks a new era in the stevia sweetener market, paving the way for greater innovation and sustainability in the F&B industry.

<https://www.foodingredientsfirst.com/news/uk-authorities-approve-purecircle-reb-m-stevia-from-bioconversion.html>

The F&B industry is at the forefront of innovation, with a focus on alternative proteins and upcycled foods to enhance food security and reduce environmental impact.

The University of California in Davis is leading the way in evaluating emerging technologies such as cultured meat and mycoprotein to determine their sustainability and economic potential. Edward Spang, an associate professor at UC Davis, emphasizes the importance of de-risking these technologies for the public good in order to support investments

and drive their success for the benefit of society. By utilizing Techno-Economic Analyses (TEA) and Life Cycle Analyses (LCA) to assess the economic performance and environmental impact of these products, UC Davis is able to provide valuable insights that can guide the future of the F&B industry towards more sustainable practices.

Spang's research on the environmental impact of cultured meat challenges the assumption that lab-grown meat is a more sustainable alternative to traditional meat production. Despite the initial perception that cultured meat

## UC Davis examines sustainability of alt-proteins, cultured meat and upcycled food

04 Jun 2024 Food Ingredients First

would have a significantly lower environmental footprint, Spang's findings suggest otherwise. The use of high-quality pharmaceutical-grade inputs and the intensive process of producing cell-based meat contribute to a higher environmental impact than previously anticipated.

This research highlights the need for further innovation in the industry to make cultured meat a more economically and environmentally viable option. By identifying areas for improvement in the production process, such as incorporating cheaper resources into the media used to develop cell-based meat, Spang's research opens up new possibilities for creating a more sustainable food system.

The team at UC Davis is currently focused on studying

food byproducts and upcycled foods, but they have found that there is a lack of reliable information available about the landscape of these ingredients. They are working to develop a database that will provide companies with the data they need to make informed decisions about utilizing these byproducts. By creating a comprehensive knowledge graph that captures relationships between foods, chemicals, and diseases, the university is helping companies identify nutritional compounds

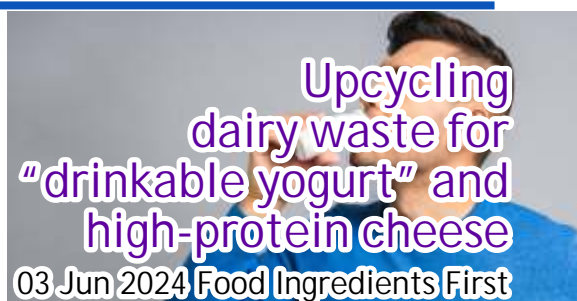
and understand the potential value of these materials. Through their research on crops like tomatoes, olive oil, almonds, and pistachios, UC Davis is leading the way in studying the potential benefits of upcycled foods and promoting sustainability in the food industry.

<https://www.foodingredientsfirst.com/news/food-science-and-tech-uc-davis-examines-sustainability-of-alt-proteins-cultured-meat-and-upcycled-food.html>

The European Union's dairy industry is facing a challenge with the increasing production of raw milk and the resulting environmental impact.

With each litre of milk production generating 2.5 litres of wastewater, the sector is under pressure to find sustainable solutions to reduce waste and improve efficiencies. Arla Foods Ingredients is leading the way by addressing dairy waste with upcycling concepts to meet the growing demand for protein-rich foods.

Claus Andersen, senior category manager at Arla Foods Ingredients, emphasizes the importance of extracting the full potential of raw milk and transforming by-streams into valuable resources. The company is developing new concepts to upcycle acid whey into nutritious dairy products, providing high protein content and addressing consumer preferences for sustainable and health-conscious options. As the high-protein trend continues to gain momentum in the dairy industry, Arla Foods Ingredients



is committed to developing innovative solutions to meet evolving consumer demands and enhance product offerings. <https://www.foodingredientsfirst.com/news/arla-foods-ingredients-upcycles-dairy-waste-for-drinkable-yogurt-and-high-protein-cheese.html>

Despite the nervousness surrounding the future of AI, there is a growing acceptance and even excitement about its potential in certain foodservice applications.

Consumers and operators are open to the idea of using AI technology to improve food safety, quality control, waste management, and nutrition and allergen analysis in the industry. Additionally, the use of AI-powered chatbots for taking orders at drive-thru, mobile, and digital platforms is gaining popularity among consumers, with 70% expressing

a positive sentiment towards this technology.

While concerns about privacy, job displacement, and ethical issues remain prevalent, it is evident that AI has the potential to revolutionize the foodservice industry. Operators believe that AI will play a significant role in shaping the industry in the next 5 to 10 years, with a majority expressing interest in utilizing AI platforms for various aspects of their operations. With consumers and operators alike showing willingness to embrace AI in foodservice, it is likely



that we will continue to see advancements in this technology that will enhance efficiency, safety, and overall customer experience in the industry. <https://www.vitafoodsinsights.com/omega-3/could-krill-oil-become-omega-3-supplement-choice>

## Dairy ingredient innovation: Key industry trends

12 Jun 2024 Food Ingredients First

In the ever-evolving landscape of the dairy industry, global consumer demand for high-quality protein and healthy but indulgent F&B products continues to drive innovation in dairy ingredients.

s continues to drive innovation in dairy ingredients. Suppliers are leveraging AI and machine learning to advance R&D efforts and are increasingly focusing on plant-based opportunities to meet sustainability goals while grappling with inflation. Leading ingredient suppliers such as Arla Food Ingredients,

FrieslandCampina Ingredients, International Flavors & Fragrances (IFF), and dsm-fermenich are at the forefront of these trends, offering innovative solutions to meet consumer demands.

From advanced whey proteins rich in essential amino acids to prebiotics and all-in-one cultures for fermented milk products, these suppliers are catering to the evolving needs of health-conscious consumers seeking products that offer both nutritional value and indulgent taste experiences. Additionally, as consumers continue to prioritize clean label ingredients and sustainability, these companies are exploring new avenues such as lactose-free dairy products and plant-based alternatives to cater to changing market demands.

Looking ahead, industry experts anticipate a continued focus on clean label ingredients, health considerations, and sustainable practices in the dairy ingredients market. As the industry aligns with initiatives like the EU's Farm to Fork strategy and responds to consumer preferences for high-protein, gluten-free, and lactose-free products, suppliers are poised to drive innovation and meet the evolving needs of the market. With technology and consumer preferences shaping the future of the dairy industry, the potential for growth and innovation in dairy ingredients remains promising.

<https://www.foodingredientsfirst.com/news/dairy-ingredient-innovation-leading-suppliers-unravel-key-industry-trends.html>

## Brands can build trust with pre- and postnatal snacks

Kimberly Decker,  
Food Beverage Insider

The discussion around snack innovations targeting pre- and postnatal consumers highlighted the importance of proper nutrition during pregnancy, debunking myths such as the need to eat for two and the necessity of catering to

### wild pregnancy cravings with strange flavour combinations.

Instead, experts emphasized the need for snacks that are palatable, nutritious, easily digestible, and cater to the changing taste preferences and needs of pregnant women. By combining sweet and savoury flavours and focusing on proven winners like ginger, lemon, honey, and lavender, snack brands can appeal to a broad audience of pre- and postnatal consumers. Additionally, transparency in ingredient labelling and an

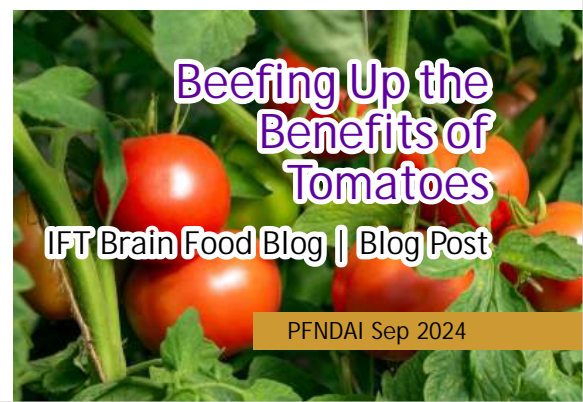
emphasis on critical nutrients like protein and folate were highlighted as key factors in developing snacks that women can trust during this sensitive time in their lives. Ultimately, creating snacks that meet the nutritional needs of pregnant women can not only fill a significant white space in the market but also build brand loyalty and trust among this important consumer demographic.

<https://www.foodbeverageinsider.com/snacks/great-expectations-brands-can-build-trust-with-pre-and-postnatal-snacks>

Jessica Cooperstone, an associate professor at The Ohio State University, is on a mission to uncover the health benefits of tomatoes and maximize their nutritional advantage.

While it's widely accepted that

fruits and vegetables are good for our health, pinpointing exactly why they are beneficial is a complex challenge. Her research focuses on the potential impact of specific compounds found in tomatoes, such as steroidal alkaloids, on human health.



## Beefing Up the Benefits of Tomatoes

IFT Brain Food Blog | Blog Post



Her work is using plant breeding and genetics to create a new tomato variety that is high in steroidal alkaloids, allowing her to study the effects of these compounds on cholesterol levels in animals. By collaborating across departments in horticulture, crop science, and food science, she is able to advance her research and potentially develop a new, beneficial commercial tomato product. She emphasizes the importance

of processing tomatoes to optimize their flavour and healthfulness, highlighting that lycopene, an antioxidant in tomatoes, is better absorbed from processed tomatoes compared to fresh ones.

As a passionate home gardener herself, Cooperstone encourages people to grow their own tomatoes and enjoy the fruits of their labour. She believes that any tomato variety grown at home can be

great, as long as it is enjoyed and consumed. With only about 10 percent of adults eating enough fruits and vegetables, her research not only sheds light on the health benefits of tomatoes but also underscores the importance of incorporating more plant-based foods into our diets for overall well-being. <https://www.ift.org/news-and-publications/blog/2024/beefing-up-the-benefits-of-tomatoes>

Nestle China's emphasis on sustainability and innovation with its new Guoran Light Coffee line not only caters to the evolving tastes of Chinese consumers but also contributes to the development of a circular economy in the coffee industry.

By upcycling cascara, the company is not only reducing waste but also promoting the diversification of coffee products and supporting local coffee farmers in Yunnan. This focus on sustainability and ethical sourcing aligns with Nestle's broader commitment to responsible business practices

and environmental stewardship.

The launch of the Guoran Light Coffee range reflects Nestle's understanding of the Chinese market and its willingness to adapt its product offerings to meet local preferences. By combining the rich flavours of cascara with the cultural significance of tea in China, Nestle is creating a unique beverage experience that resonates with consumers seeking novel and health-conscious drink options. As the company continues to explore new ways to innovate and



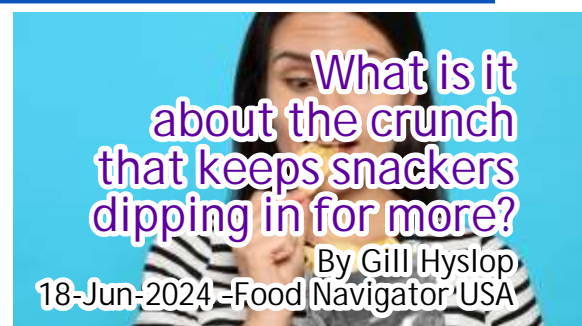
engage with consumers, the Guoran Light Coffee line represents a bold step towards driving growth and reshaping the coffee industry in China. <https://www.foodnavigator-asia.com/Article/2024/06/12/Nescafe-China-touts-dual-beverage-experience-with-upcycled-cascara-drink-line>

The sound of snacking is a fascinating aspect of the overall eating experience that has a significant impact on consumer perception and satisfaction.

From the Crunch Effect to the use of onomatopoeic words, researchers have found that the sound of food while being eaten can influence consumption behaviour. It has been shown that consumers will eat more if they cannot hear their own chewing, while noisy snackers tend to enjoy the experience

more and consume more food. The sound of food can also affect perceptions of freshness and quality, with a loud crunch often associated with freshness and appeal.

Marketers have been quick to capitalize on the importance of food sound salience in engaging consumers and enhancing the tasting experience. By manipulating the frequency and amplitude of the sound feedback produced when eating a snack, researchers have been able to demonstrate a link



between sound and perceptions of overall product quality. Sonic words, like slurp, chomp, munch, snap, and plop, also play a role in shaping consumer perceptions of food healthfulness and palatability.

The study of chewing sounds is a complex and scientific field that involves understanding the characteristics of the jaw, teeth, and soft tissues in the mouth, as well as factors like

bone conduction and air conduction. In conclusion, the sound of snacking is a crucial element of the multisensory experience that should not be overlooked by product

developers and marketers. <https://www.foodnavigator-usa.com/Article/2024/06/18/the-science-of-sound-what-is-it-about-the-crunch-that-keeps-snackers-dipping-in-for-more>

## What's next in biscuits?

By Natasha Spencer-Jolliffe  
24-May-2024 - Food Navigator

Exciting trends to watch emerging in the biscuit market include a shift towards more plant-based and sustainable options to meet the growing demand for environmentally friendly and health-focused snacks.

Brands are exploring alternative proteins and ingredients, such as pulses and legumes, to meet consumer preferences for cleaner labels and planet-friendly options. Additionally, a focus on regenerative agriculture and carbon-related claims are driving manufacturers to adopt circular approaches and promote eco-friendly practices. With a growing emphasis on transparency and environmental consciousness, the future of biscuits, cookies, and crackers looks promising as brands continue to innovate and meet the evolving demands of consumers.

Flavour explosions are taking the biscuit market by storm, with consumers seeking indulgent and adventurous tastes. Limited edition varieties and seasonal offerings create a sense of excitement and urgency, leading to impulse purchases. Biscuit brands are exploring new textures, shapes, and flavours to deliver fun and novelty to consumers. Healthier options with reduced sugar content, whole grains, and natural ingredients are also on the rise to meet the increasing demand for functional biscuits. Manufacturers are reformulating products to offer added nutritional value and cater to health-conscious consumers.

Balancing indulgence with health benefits, brands are providing options that promote physical health, weight management, and overall well-being. As consumers look for healthier alternatives, biscuit brands are incorporating ingredients and flour alternatives such as sprouted grains, almond flour, and coconut flour to enhance the nutritional profile of their products. With a focus on delivering both taste and health benefits, the biscuit market is evolving to meet the changing

preferences of today's consumers.

As consumers become more health-conscious, the focus on protein in biscuits is expanding to include functional content beyond just muscle growth. Consumers are looking for biscuits that not only provide protein but also offer energy, stamina, and weight management benefits. To meet this demand, startups and scientists are turning to innovative techniques such as molecular farming and gene editing to enhance biscuit profiles. Additionally, consumers are becoming more open to incorporating specialized functional ingredients like probiotics and collagen into their diets. This shift towards functional content in biscuits is reshaping the industry, with brands launching region-based products and globalizing local flavours to appeal to a diverse consumer base. The combination of traditional appeal and innovative techniques is driving the growth of the biscuit market as consumers seek out authentic, high-quality products.

<https://www.foodnavigator.com/Article/2024/05/24/What-s-next-in-biscuits/>

Urban Legend has tackled the challenge of creating healthier doughnuts by leveraging reformulation strategies, patented technology, and consumer insights. The brand offers non-HFSS (high in fat,

sugar, and salt) doughnuts in stores in the UK.

Urban Legend was not a traditional doughnut brand that sought to reformulate. Instead, they created a brand-

## Non-HFSS doughnuts: Which nutrient is toughest to cut when reinventing the wheel?

By Flora Southey 13-Mar-2024 - Food Navigator

new product from scratch, allowing them to rethink both formulation and process. The company uses sugar replacers found in melons, pears, roots, and leaves, and natural colour extracts from flowers, plants, and vegetables. They developed a patented manufacturing process using novel starch and protein technologies that allow dough to be 'set' by a beam of steam rather than conventional frying. Urban Legend uses instant consumer feedback to iterate and improve their product, ensuring it meets

consumer expectations.

Nutritional Improvements - 65% less fat 30% less sugar 30% fewer calories 70% less saturated fat compared to branded alternatives. The most challenging nutrient to limit was saturated fat, which is essential for frying and coating the doughnut. Urban Legend overcame this by using a micro layer of fat on the outside of the doughnut. Sugar and fat serve multiple functional purposes in doughnuts, making it difficult to remove them



without affecting the product's quality. There is significant market potential for healthier indulgence products, especially with incoming junk food regulations and a move towards more responsible practices.

<https://www.foodnavigator.com/Article/2024/03/13/urban-legend-and-non-hfss-doughnuts-reformulation-challenges/>

## What advances is AI making in bakery and snacks?

By Natasha Spencer-Jolliffe  
28-May-2024 -Food Navigator Asia

The increasing importance of AI in the bakery and snack industries is evident in how it is not only transforming production processes but also revolutionizing consumer experiences.

By democratizing access to products and services, AI is making it easier for consumers to make informed choices based on their budget, preferences, and health goals. This is particularly crucial at a time when digital shoppers are driving the demand for online delivery services and personalized recommendations. Moreover, AI is playing a significant role in proactive and preventative health measures by providing insights into how certain foods can impact blood

sugar levels and overall health. Companies like January are leading the way in leveraging AI technology to empower consumers to make healthier choices. Additionally, AI is guiding product development for large corporations, as they aim to improve nutritional profiles and tackle the global rise in chronic diseases. In the realm of culinary education, AI is even being used to teach top-level patisserie theory and techniques through platforms like Pastry Class, highlighting the diverse applications of AI in the baking industry.

As the bakery and snack industry enters the next era of technological advancement, AI is becoming a crucial tool for businesses looking to streamline operations, enhance customer experiences, and future-proof their operations. With the help of AI, companies like Vaasan and Glico are revolutionizing their production processes, marketing strategies, and customer engagement efforts. By

leveraging AI-powered systems, bakeries can accurately forecast demand, ensure food safety compliance, and automate repetitive tasks, freeing up time for more creative endeavours.

Moreover, as algorithmic transparency becomes increasingly important in the digital landscape, companies like Wolt are leading the charge in providing insights into how AI works and how it can benefit both businesses and consumers. By shedding light on the computational processes behind their platforms, companies can build trust with their customers and ensure fairness in decision-making processes. With the right information and understanding of AI, bakery and snack brands can navigate the evolving regulatory landscape and harness the power of technology to drive growth and innovation in the industry.  
<https://www.foodnavigator-asia.com/Article/2024/05/28/what-advances-is-ai-making-in-bakery-and-snacks/>

AI disruption in the food industry is inevitable, with technologies like machine learning, algorithms, and data

sets already revolutionizing various processes.

In the future,

## How will AI have changed the food industry in five years?

By Flora Southey 20-Jun-2024 -Food Navigator



AI is likely to take over mundane tasks, such as monitoring food waste in restaurants, enabling industry players to focus on offering quality products and services. This can lead to greater efficiency, sustainability, and economic benefits throughout the food system. Additionally,

AI can help food and beverage brands understand consumer trends better, allowing them to develop products that align with consumer preferences and market demands.

In terms of fruit and vegetable cultivation, AI-powered technology can enhance logistics and quality control, ensuring retailers have a better handle on fresh produce supply. This can lead to improved decision-making and potentially reduce supply shortages due to weather events. Furthermore,

AI disruption is expected to reshape food retail sectors, with advancements like AI-powered in-store navigation, allergen scanning, and image-recognition scales transforming the shopping experience for consumers. Overall, the food industry should embrace AI disruption as a means to enhance efficiency, sustainability, and consumer satisfaction.

<https://www.foodnavigator.com/Article/2024/06/20/how-will-ai-change-the-food-industry>



## The next-step in plant-based? Understanding the extruder

René Floris, NIZO Food Research Division Manager  
19-Jun-2024 -Food Navigator

Consumers want more from plant-based meat alternatives, from taste to texture and affordability.

Could understanding the extrusion process deliver on all three?

The recent plateau in the market for plant-based meat substitutes has prompted experts like Steven Cornet to suggest that a better understanding of the extrusion

process could be the key to moving the industry forward. While plant-based options are still popular among consumers, there is a demand for products that not only taste good but also have a satisfying texture and are affordable.

By optimizing the extrusion step in the production process, manufacturers could potentially create plant-based meat substitutes that meet all of these criteria in one step, reducing the need for costly post-processing.

However, the extrusion process is not fully understood, particularly in terms of its impact on flavour and texture. For example, the temperature and residence time during extrusion have been found to affect the levels of volatile compounds that contribute to flavour in plant-based products. While it may seem

straightforward to adjust these factors to create the desired taste and texture, the reality is much more complex.

This is why a new consortium led by NIZO Food Research is being formed to investigate the science of the extrusion process and provide a deeper understanding of how ingredients interact, how processing conditions affect flavour compounds, and how texture influences taste perception.

By bringing together experts from across the plant-based value chain, this consortium aims to address the challenges faced by manufacturers in developing new and improved plant-based products.

<https://www.foodnavigator.com/Article/2024/06/19/extrusion-technology-to-propel-plant-based-nizo>





Consumer understanding of the term 'ultra-processed' may be low, but does it really matter in the larger scheme of things?

While there is a lack of consensus on what exactly constitutes ultra-processed foods, the term has been linked to negative health outcomes by organizations such as the World Health Organisation.

On one hand, there is a need for consumers to be more educated about the foods they are consuming and the potential health implications of ultra-processed foods. However, there is also a need for a more nuanced understanding of what constitutes a healthy diet, beyond simply avoiding UPFs. While the Nova classification

may be a helpful guideline, it is important for consumers to consider factors such as nutrient density and overall diet quality when making food choices.

Additionally, alternative categories such as HFSS may provide a more comprehensive approach to identifying 'unhealthy' foods, taking into account both negative and positive nutrients.

Ultimately, a more informed and holistic approach to food

Excess sodium intake is a major health concern in Indonesia, contributing to the high prevalence of high blood pressure and other health issues.

The introduction of low-sodium potassium-rich salt substitutes (LSSS) could have a significant impact on the health of the population and reduce the burden on the health system. Research conducted by Griffith University has shown that replacing traditional table salt with LSSS could lead to a reduction in blood pressure, prevent cardiovascular events, strokes, and kidney disease, and ultimately result in substantial cost savings for the healthcare system.

Indonesians consume more sodium than is necessary for their health, making LSSS an attractive option to help them reduce their intake without compromising on taste. The implementation of LSSS could benefit populations across all income brackets, with the most significant health gains seen in low-income groups. The research findings highlight the potential impact of LSSS on public health and support the need for policymakers to consider promoting and making these alternatives more widely available to the population.

With the support of government intervention

# REGULATORY NEWS

## Does it matter that consumers don't understand the term 'ultra-processed'?

By Augustus Bambridge-Sutton  
17-Jun-2024 - Food Navigator

choices is crucial for promoting better health outcomes for individuals and communities.

<https://www.foodnavigator.com/Article/2024/06/17/Ultra-processed-misunderstood-by-consumers-Does-it-matter>

and global attention, the implementation of LSSS could lead to a significant improvement in the overall health and well-being of Indonesians.

(Aminde et al. Cost-effectiveness analysis of low-sodium potassium-rich salt substitutes in Indonesia: an equity modelling study. *The Lancet Regional Health - Southeast Asia*, 2024; 100432 DOI: [10.1016/j.lansea.2024.100432](https://doi.org/10.1016/j.lansea.2024.100432))

## Low-sodium alternatives can lead to major health gains in Indonesia

June 14, 2024 Science Daily

## FDA to start special drive in Pune to check food adulteration

Vicky Pathare Sep 05, 2024  
Hindustan Times

FDA Pune launches a drive from Friday to combat food adulteration during festivals, ensuring safety in food production and hygiene practices.

The Food and Drug Administration (FDA) Pune will start a special drive from Friday to check adulteration in samples of food items and sweets.

As per officials, between September and December, there are festivals like Ganeshotsav, Dussehra, Diwali, and Christmas. However, during this season there is also a rise in the adulteration of food products driven by financial incentives to meet the growing demands of consumers. Following directions from the FDA headquarters, the action will be taken as per the provisions of the Food and Safety Act 2006, Rules and Regulations 2011.

"The production of food items in unhygienic conditions, improper storage, and handling leads to contamination, poses health risks to consumers and diminishes the sanctity of the festivals. Repeated enforcement and inspection campaigns should be conducted

to ensure the safety of products and to verify that they comply with food safety standards," said Ulhas Ingawale, joint commissioner, FDA, headquarters.

Suresh Annapure, joint commissioner, FDA, Pune region, said, during the drive, there will be strict vigilance over the production and sale of milk and dairy products such as khoya and sweets during the festive period. "Suspicious food items will be seized, and samples will be sent to the lab for testing. Besides, if required repeated enforcement and inspection will be conducted to ensure the safety of food items and to verify that they comply with food safety standards," he said.

Another senior official said, "A

meeting with food business operators in Pune will be organised to guide them on legal provisions and hygiene practices. Instructions will be given to ensure the production, storage, transportation, and sale of sweets in a hygienic environment. Besides, food safety on wheels will be utilised for food sample testing, training of food business operators, and raising consumer awareness," he said.

Annapure, further informed that the drive will include mandals to ensure that the 'prasad' or sweets distributed are prepared under hygienic conditions to prevent any food poisoning incident.

<https://www.hindustantimes.com/cities/pune-news/fda-to-start-special-drive-in-pune-to-check-food-adulteration-101725478893699.html>

The EFSA Panel on Nutrition, Novel Foods and Food Allergens (NDA) plays a crucial role in providing scientific opinions to the European Commission (EC) on setting tolerable upper intake levels (UL) for various nutrients, including preformed vitamin A and  $\beta$ -carotene.

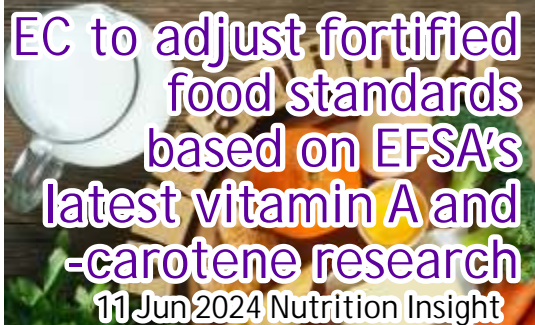
High intakes of certain nutrients can have adverse health effects, so it is important to establish these limits to ensure consumer safety. The SCF advised that the intake of preformed vitamin A be restricted to 1500 mg retinol equivalents (RE) a day in postmenopausal women based on its effects on bone mineral density and bone fracture risk.

The EFSA's work in this area is essential for supporting risk managers and public health

bodies in making informed decisions and providing advice to consumers.

The panel conducted systematic reviews of the literature on the adverse health effects of excess vitamin A intake, such as teratogenicity, hepatotoxicity, and bone health. Based on the available data, the UL for preformed vitamin A was set at 3000 mg RE a day for adults, with specific recommendations for vulnerable groups like women of childbearing age, pregnant and lactating women, and postmenopausal women.

The panel also highlighted the importance of monitoring intake levels of vitamin A and  $\beta$ -carotene in fortified foods and food supplements, particularly for sensitive consumer groups like young



EC to adjust fortified food standards based on EFSA's latest vitamin A and  $\beta$ -carotene research  
11 Jun 2024 Nutrition Insight

children. This scientific advice from EFSA supports the EC and member states in setting maximum amounts of vitamins and minerals in fortified foods and food supplements to protect public health.

<https://www.nutritioninsight.com/news/ec-to-adjust-fortified-food-standards-based-on-efsas-latest-vitamin-a-and-carotene-research.html>

The increasing demand for botanical ingredients in foods and beverages is pushing manufacturers to seek out quality solutions that can enhance products with unique flavour profiles and potential functionality while maintaining clean labels.

According to data from Innova Market Insights, the use of botanical ingredients in global food and beverage launches has been steadily increasing. Bakery products were the most popular category, with garlic being the top botanical ingredient. Consumers are increasingly looking for botanical and herbal supplements as a natural alternative.

Flavour players like Symrise and Givaudan are at the forefront of incorporating botanicals into food and beverage products to deliver a holistic consumer

experience that combines taste, smell, and functionality. Companies like ADM are working directly with growers to source high-quality botanical ingredients that not only enhance flavour but also offer wellness benefits.

Key botanical ingredients like ginger, acerola, and guarana are gaining attention for their perceived health benefits, while lesser-known ingredients like carob and green rooibos extract offer untapped potential for innovation. Additionally, marine botanical ingredients like seaweed and kelp are on the rise, meeting the demand for sustainably sourced and functional ingredients in food and beverages.

As the functional beverage space continues to evolve, botanical-infused products like teas, waters, and RTD juices



## Botanicals boost clean label and sustainability credentials with "natural" appeal

03 Jul 2024 Nutrition Insight

are becoming increasingly popular.

The convergence of foods and dietary supplements is opening up new opportunities for incorporating botanicals into a wide range of products, from gummies to snacks and confectionery items, to support overall health and wellness goals.

<https://www.foodingredientsfirst.com/news/botanicals-boost-clean-label-and-sustainability-credentials-with-natural-appeal.html>



in bold letters with a larger font size, consumers will be empowered to make healthier decisions and combat the rise of non-communicable diseases in the country.

This move aligns with global efforts to promote public health and well-being by providing clear and distinguishable labelling requirements that prevent false and misleading claims on product labels.

In addition to promoting better health through transparent labelling, the FSSAI's recent directives on misleading claims by Food Business Operators aim to protect consumers from inaccurate information about the products they are

purchasing. By mandating the removal of terms like 'Health Drink' and '100% fruit juices' from labels and advertisements, the regulator is ensuring that consumers have access to accurate information about the nature and functional properties of the food products they consume.

These efforts underscore the FSSAI's commitment to reducing cases of misleading claims in the food industry so that consumers can make informed choices and prioritize their health and well-being.

<https://www.foodingredientsfirst.com/news/indian-food-safety-watchdog-revamps-food-pack-labels-to-highlight-fat-and-sugar-content.html>

The new regulations put forth by the FSSAI in India regarding food packaging labels are set to revolutionize the way consumers make dietary choices and understand the nutritional value of the products they purchase.

By highlighting the total sugar, salt, and saturated fat content

## FSSAI withdraws advisory on removal of claims of 'A1', 'A2' types of milk, milk products

PTI: Aug 26, 2024, The Economic Times

The Food Safety and Standards Authority of India (FSSAI) has withdrawn its advisory that directed food businesses to remove 'A1' and 'A2' claims from milk products packaging.

This step allows companies to continue marketing products with these claims. The decision comes after a need for further consultations with stakeholders was identified.

Food safety regulator FSSAI on Monday withdrew its recent advisory wherein food

businesses were directed to remove claims of 'A1' and 'A2' types of milk and milk products from packaging. The Food Safety and Standards Authority of India (FSSAI) said the advisory has been withdrawn to carry out further consultations with stakeholders. It would imply that food business operators (FBOs) can continue to sell and market their products with claims of 'A1' and 'A2' types of milk. A1 and A2 milk differ in their beta-casein protein composition, which varies based on cow breed.

In a fresh advisory issued on Monday, the regulator said, "the advisory dated August 21, 2024... stands withdrawn for further consultation and engagement with the

stakeholders".

The FSSAI, in its advisory dated August 21, had asked FBOs to remove claims of 'A1' and 'A2' from their products. E-commerce platforms were also told to remove these claims from products and websites immediately. The regulator had said that the claims of 'A1' and 'A2' types of milk and milk products do not conform with the Food Safety and Standards Act, 2006. After examination, the FSSAI had found that A1 and A2 differentiation is linked to the structure of beta-casein protein in milk. However, current FSSAI regulations do not recognise this differentiation. In the August 21 advisory, FBOs were also asked to exhaust pre-printed labels within six months, with no further extensions to be granted.

## Sugar showdown: Australia weighs tax on sweetened beverages to fight diabetes

05 Jul 2024 Food Ingredients First

The Australian parliamentary committee report on the prevalence of diabetes mellitus in the country has sparked discussion and action on combating non-communicable diseases (NCDs) through policy reforms.

The recommendations put forth by the committee, such as

requiring clear front-of-pack (FoP) labelling of added sugar amounts, implementing a sugar tax on beverages, and regulating marketing of sugary products to children, have been met with support from the Australian Medical Association (AMA).

The AMA believes that implementing these reforms could have a significant impact on preventing obesity and reducing the prevalence of chronic diseases, such as type 2 diabetes, in Australia. They argue that a sugar tax could not only generate revenue to fund preventative health activities but also lead to thousands of fewer cases of diabetes, heart

disease, and stroke over time.

The AMA also highlights the importance of regulating advertising and marketing of unhealthy foods to children in order to establish healthy eating habits early on and combat the obesity epidemic in Australia. Overall, the recommendations made by the committee and supported by the AMA are seen as crucial steps in improving the health outcomes of Australians and addressing the national health crisis at hand.

<https://www.foodingredientsfirst.com/news/sugar-showdown-australia-weighs-tax-on-sweetened-beverages-to-fight-diabetes.html>

Food companies have a moral responsibility to ensure the safety and well-being of their customers.

By implementing and

maintaining proper food safety procedures, companies not only protect human lives but also safeguard their brands from irreparable damage.

## Addressing brand damage and legal risk in food safety issues

Guy Yehiav, Fast Company

In a world where news travels fast and public perception is easily swayed, any mishandling of food safety issues can have long-lasting effects on a company's reputation and financial stability. Investing in advanced technology that streamlines compliance and process improvement can help companies stay ahead of potential risks and demonstrate their commitment to excellence in food safety practice.

Building and maintaining brand

equity is a crucial aspect of any successful business, especially in the food industry. Companies that fail to prioritize food safety and customer satisfaction risk losing everything they have worked so hard to achieve. By adopting digital food safety procedures and ensuring that all necessary precautions are in place, companies can protect themselves from lawsuits and show their customers that their well-being is a top priority. Going above and beyond in demonstrating reasonable care

can not only prevent legal ramifications but also strengthen consumer trust and loyalty in the long run.

Food companies must strive to exceed industry standards and meet the ever-changing demands of consumers who are increasingly conscious of quality, nutritional substance, and overall well-being.

<https://www.fastcompany.com/91137429/addressing-brand-damage-and-legal-risk-in-food-safety-issues>



## I.T.S innovates "smoke-free" flavour as F&B industry prepares for EU smoke ban

17 Jun 2024 Food Ingredients First

As the EU moves towards banning traditional smoked food flavours used in meat and cheese products, soups, sauces and snacks, International Taste Solutions (ITS) has identified a gap in the market for innovative and safe alternatives with introduction of their new range of smoke-free natural

### flavourings.

The company's extensive range of smoke flavours provides manufacturers with a clean label solution, allowing them to maintain the authentic taste and aroma of smoke in their products without the need for complex on-pack labelling declarations.

The demand for smoked flavours, not only in meat products but also in the growing plant-based category, is on the rise. ITS's 15 smoke flavour alternatives, including both familiar and unique smoked styles, cater to a wide

range of applications from meats to baked goods and snacks. By offering safe and compliant smoke-free options, ITS is helping F&B manufacturers stay ahead of the regulatory changes while still meeting consumer demands for smoky flavours.

As the industry adjusts to the impending ban on traditional smoked food flavours in the EU, companies are paving the way for a new era of natural and innovative flavour solutions.

<https://www.foodingredientsfirst.com/news/its-innovates-smoke-free-flavor-as-fb-industry-prepares-for-eu-smoke-ban.html>

## FSSAI launched a project to tackle microplastic contamination in food, starting in March.

The initiative involves collaboration with key research institutions to develop detection methods and understand exposure levels in India. The findings aim to ensure consumer safety and guide regulatory actions to protect public health. Food regulator FSSAI has launched a project to assess microplastic

contamination in food products and develop methods for its detection. The Food Safety and Standards Authority of India (FSSAI) has launched an innovative project to tackle the growing concern of microplastic contamination in food, recognising microplastic pollution as an emerging threat that requires immediate attention.

According to an official statement, the project -- Micro-and Nano-Plastics as Emerging Food Contaminants:



## FSSAI launches project to address microplastic contamination in Indian food products

PTI: Aug 18, 2024, The Economic Times

Establishing Validated Methodologies and Understanding the Prevalence in Different Food Matrices -

was started in March this year. The aim is to develop and validate analytical methods for detecting micro and nano-plastics in various food products, as well as assess their prevalence and exposure levels in India. "The primary objectives of the project include developing standard protocols for micro/nano-plastic analysis, conducting intra- and inter-laboratory comparisons, and generating critical data on microplastic exposure levels among consumers," FSSAI said.

This study is being implemented in collaboration with leading research institutions across the country, including the CSIR-Indian Institute of Toxicology Research (Lucknow), ICAR-Central

Institute of Fisheries Technology (Kochi), and the Birla Institute of Technology and Science (Pilani). FSSAI pointed out that the Food and Agriculture Organization (FAO), in its recent report, has highlighted the presence of microplastics in common food items like sugar and salt.

"While the report underscores the global prevalence of microplastics, it also emphasises the need for more robust data to fully understand the implications for human health and safety, particularly in the Indian context," the regulator said. FSSAI said it is committed to ensuring that Indian consumers have access to safe and healthy food.

While global studies have highlighted the presence of microplastics in various foods, FSSAI said it is imperative to generate reliable data specific to India. "This project will help understand the extent of microplastic contamination in Indian food and guide the formulation of effective regulations and safety standards to protect public health," the regulator said. The findings from this project will not only inform the regulatory actions but also contribute to the global understanding of microplastic contamination, it added.

<https://economictimes.indiatimes.com/industry/cons-products/food/fssai-launches-project-to-address-microplastic-contamination-in-indian-food-products/articleshow/112606666.cms>

The draft regulations put forth by the Thai government aim to provide clarity and consistency in the labelling and marketing of plant-based and alternative protein products in the country.

By banning certain animal-related terms on packaging and requiring products to clearly indicate their plant-based nature, the government hopes to reduce consumer confusion and ensure the safety and transparency of these products. This move is particularly timely as alternative proteins are gaining popularity amongst consumers in Thailand and around the world.

The regulations also highlight

the Thai government's commitment to promoting innovation and diversity in the food industry, as they are not only focusing on plant-based proteins but also looking into other alternative protein sources such as insect-based, cultivated meat, and fermentation. By setting standards and criteria for these emerging sectors, the government is paving the way for the growth and development of a more sustainable and environmentally friendly food industry in Thailand.

Overall, these regulations demonstrate the government's



**Thailand drafts new alt-protein policies that ban certain animal-related terms for plant-based products**

Pearly Neo  
10-Jun-2024 -Food Navigator Asia

proactive approach towards regulating the alternative proteins industry and ensuring the safety and quality of these products for consumers.

<https://www.foodnavigator-asia.com/Article/2024/06/10/thailand-drafts-new-alt-protein-policies-that-could-ban-certain-animal-related-terms-for-plant-based-productslife-style/food-new1=3728>

**Bisphenol battle: Indonesia formalises new regulations mandating BPA leaching warnings on water bottles**

Pearly Neo 05-Jun-2024 -Food Navigator Asia

The Indonesian government's decision to mandate warnings on water bottles containing BPA is a positive step towards protecting public health.

With increasing awareness of the potential dangers of BPA, it is crucial for consumers to be informed about the risks associated with this chemical leaching into their drinking water.

By requiring manufacturers to provide clear warnings and storage instructions on their packaging, the government is taking proactive measures to ensure the safety of its citizens.

While the transition period may allow companies time to update their labels, it is important for them to act swiftly in order to comply with the new

regulations. The potential health hazards of BPA, particularly in vulnerable populations such as children, make it imperative for the government to enforce strict guidelines on its use in packaging materials. It is hoped that these regulations will not only protect consumers from harmful exposure but also encourage the industry to



explore alternative, safer packaging options in the future. <https://www.foodnavigator-asia.com/Article/2024/06/05/indonesia-formalises-new-regulations-mandating-bpa-leaching-warnings-on-water-bottles>



## European food safety report 'taking pot shots' at popular botanicals

By Nikki Hancocks  
13-Jun-2024 - NutraIngredients

The publication of the report by the Working Group on Food Supplements outlining the potential ban or restriction of 12 critical ingredients has stirred controversy within the health and wellness industry.

The report, which identified substances like ashwagandha, curcumin, maca, and melatonin as potentially dangerous, has sparked concerns among

In the world of food marketing, terms like 'better for you' and 'healthy' are commonly used to entice consumers to purchase certain products.

However, these terms cannot simply be thrown around without proper context and regulation. In the EU, health claims are tightly regulated under Regulation 1924/2006, and must be backed up by specific health claims in order to be considered valid. This means that terms like 'better for you' must be accompanied by precise information

experts and stakeholders in the market. The European food safety agencies' heads unanimously adopted a list of critical substances based on the report, highlighting the need for heightened safety measures in the production and distribution of dietary supplements.

However, criticisms have emerged regarding the report's methodology and the potential consequences of banning or restricting these ingredients. European regulatory expert Luca Bucchini raised concerns about the bias in the report and emphasized the importance of impartial scientific assessments

regarding the health benefits of the product in question.

Consumer trust is also a major factor to consider when using health claims in food marketing. According to a recent report, a significant portion of consumers distrust food manufacturers, and may not believe health claims even if they are backed up by specific evidence. It's important for companies to be transparent and clear about the health benefits of their products in order to gain the trust of consumers. Overall, while terms like 'better for you' and 'healthy' can be

in developing regulations. Ethnobotanist Chris Kilham also criticized EU regulators for their lack of scientific rigor and suggested that regulators need to consult industry experts for a more comprehensive understanding of the safety of botanical ingredients.

As discussions continue around the implementation of the proposed bans and restrictions, it is crucial for policymakers to consider all available scientific data and ensure that consumer access to essential dietary supplements is not compromised.

<https://www.nutraingredients.com/Article/2024/06/13/European-food-safety-report-taking-pot-shots-at-popular-botanicals>



## How are 'better for you' and other health claims regulated?

Augustus Bambridge-Sutton  
12-Jun-2024 - NutraIngredients

powerful marketing tools, they must be used responsibly and in compliance with regulations in order to truly benefit consumers and build trust in the industry.

<https://www.nutraingredients.com/Article/2024/06/12/how-are-health-claims-regulated>

## 'Use it - or be made to': ANZ ministers give food firms 17 months to hit Health Star Ratings targets

By Pearly Neo  
19-Jun-2024 - Food Navigator Asia

The potential move towards mandatory implementation of the Health Star Rating (HSR) system in Australia and New Zealand has sparked a heated debate within the food industry.

While consumer demand for the

HSR system seems to be high, with a majority of shoppers indicating trust in the system, food firms are facing challenges in meeting the uptake targets set by the government. Issues such as limited space on product labels, perceived flaws in the rating system, and concerns about the impact on sales of products with low ratings have been raised by industry stakeholders.

Some food manufacturers have expressed reluctance to adopt the HSR system across their entire portfolio, citing concerns about the perceived inaccuracies in the rating of their products. There is also a call for improvements to the HSR system, including changes

to the algorithm and the size of the logo on product labels.

It remains to be seen whether the government will follow through with mandatory implementation of the HSR system if the 70% uptake target is not met by November next year, but it is clear that the food industry will need to address these challenges in order to comply with potential regulations and meet consumer demand for transparent and informative labelling.

<https://www.foodnavigator-asia.com/Article/2024/06/19/anz-ministers-gives-food-firms-17-months-to-hit-health-star-ratings-targets-or-risk-mandatory-implementation/>

## USDA pushes forward label updates for cultured-meat, uncured claims, Nutrition Facts

By Elizabeth Crawford  
12-Jun-2024 - Food Navigator USA

The USDA is working diligently to address a backlog of much-needed updates to labels for meat and poultry products.

Jeff Canavan, USDA deputy

director of FSIS's Labelling and Program Delivery Division, stated that the agency anticipates finalizing proposed rules for uncured and cultivated products within the next year. In addition, they are working on modernizing the Nutrition Facts panel for meat and poultry products, with plans to publish the proposed rule soon.

One of the key areas of focus for the USDA is tightening restrictions on uncured labelling to address new technology and ensure consumer transparency. Canavan highlighted the need to update regulations on uncured products, particularly

in response to concerns raised by the Center for Science in the Public Interest.

The agency is also set to publish a proposed rule for labelling cell cultured meat and poultry, in collaboration with the FDA. Overall, the USDA is dedicated to bringing their regulations up to speed with current technologies and providing consumers with accurate and informative labelling on meat and poultry products.

<https://www.foodnavigator-usa.com/Article/2024/06/12/usda-pushes-forward-label-updates-for-cultured-meat-uncured-claims-nutrition-facts>

