

PFNDAI

FOOD, NUTRITION & SAFETY MAGAZINE

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OF FRUITS AND
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Mr Martin Jojo

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EDITORIAL

People are told that cheese may be unhealthy because of high content of fat including saturated fat and cholesterol. It may also be high in sodium. However, this is one of the most favourite food, which is not just eaten as such, but very frequently with other foods as fun food e.g. in burgers, pizza and many other snacks. So is it good or not?

Cheese was considered unhealthy because it was thought that because of high saturated fat, cholesterol and sodium, it may not be good for heart health especially for people with elevated cholesterol. Different cheeses and brands would have varying amounts of above but still one can consume cheese because of many health benefits it offers. It can be part of healthy diet especially when combined with other healthier foods and diet consisting of fruits and vegetables and limited amounts of meats, especially red meat.

Cheeses are high in protein, calcium, phosphorus, vitamins B12 and A. some of the cheeses like mozzarella and Swiss are also much lower in sodium. Thus considering the nutrients present, it would be certainly prudent to consume cheeses rather than avoid them.

Most cheeses also have bacteria, which are beneficial to health. The process of making cheeses contain not only fermentation to provide for growth of these useful bacteria but many cheeses are ripened which further provides for the growth of healthy bacteria.

Some people are lactose intolerant so they are advised to avoid dairy products. Cheeses, especially firmer cheeses like cheddar and Swiss are lower in lactose and may be tolerated in modest amounts like yogurt.

Highest consumption of cheese is in France and people eat much more there than in the US. However, the way it is eaten is different. While Americans love to eat dishes like melted into pasta, topping of burger, coating a pizza or stacked on crackers while French prefer eating cheese in salads and even before or as desserts. This may make difference in the health effects. French have lowest heart disease incidence globally.

Indians have also started acquiring tastes for cheeses and many of the other foods including burgers and pizza. They do not consume red meats much while their consumption of grains is quite high. On the other hand, the diets are leaning towards refined grains, less vegetables and fruits, and consequently lesser dietary fibre. These are certainly not conducive for good health. There should be some rethinking and changes in the diet to healthier pattern to avoid long-term effects on the health. Cheese could certainly be a part of healthy diet.

Prof Jagadish Pai,
Executive Director, PFNDI

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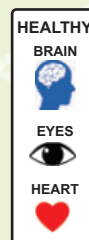
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FOOD FOR THOUGHT OR THOUGHT FOR FOOD



AUTHOR

Dr B Sesikaran,

**Former Director,
National Institute of Nutrition (ICMR)
Hon. Scientific Director, PFNDI**

While the world is worried about the impact of climate change and global warming, there is a Silent Pandemic (as described in the Lancet, Nov 29, 2022) which is ominously spreading across the world called Anti-Microbial Resistance (AMR) or simply Antibiotic Resistance of bacterial infections.

We recently were asked to approve the use of a new antibiotic which is still on clinical trials for a child who has acquired a lung infection which has been found to be resistant to all the antibiotics that are available in the country. Almost on a daily basis several patients admitted into intensive care units soon develop infections due to these resistant bacteria and succumb to it, while medical Professionals are helplessly watching since no antibiotic seems to be working. It is really a challenge and nightmare to manage this disastrous situation.

Does it have any relevance to food and nutrition?

Many infections, both upper respiratory and diarrheal infections can be managed or prevented with a good balanced diet rich in antioxidant and immune boosting nutrients. Fruits and vegetables or spices are full of bioactive molecules which promote immunity and also act as

anti-oxidants. A well-nourished person will be able to get over many of these infections without the use of antibiotics. Probiotics can possibly minimise the use of antibiotics in diarrheal disease and it is also promising to know that several bioactive components of these probiotic bacteria (post-biotics) have antibacterial properties by themselves and could possibly be a future option against the use of antibiotics indiscriminately. Large community studies in India and abroad have demonstrated the prophylactic use of Probiotics in neonatal sepsis, Diarrheal diseases in children, Acute Viral infections etc{ (Sur et al; Epidemiol Infect (2011); Gleeson et al, Int J of Sports Nutr and Excer metab (2011), Panigrahi et al Nature (2017), Sinha et al Trials (2021), Sinha et al BMJ open (2015)}

Global warming can increase the incidence of infections in farm animals, leading to further use of antibiotics and further propagation of antimicrobial resistance. The way to combat AMR is through a One-Health approach which is inclusive of the management of environment, agriculture practices, veterinary use of drugs as well as human health. Health care professionals need to restrict use antibiotics. Very often we find that even for trivial viral infections which are self-limiting, medical professionals as well as patients themselves use the most high-end antibiotics which is one of the major contributing factors for antimicrobial resistance.

A Recent publication in Nature Microbiology (Montassier et al,

Nature Micro, Vol 6: Aug 2021) has thrown up interesting relationship between the administration of probiotics and antimicrobial resistance. To summarise-
1. Supplementation with a commercial probiotic preparation containing commonly used species can reduce the number of antimicrobial resistance genes(ARG) in the lower GI tract. This however happens in individuals where the probiotics can colonise effectively and thus dilute the ARG gene pool in those not on anti-biotics.

2. Antibiotic administration increase the ARGs and these can be minimised or eliminated either by spontaneous recovery over a period of time or by Faecal Microbial Transplant(FMT)
3. In contrast to this, post antibiotic or parallel supplementation of probiotics prevents the reduction of ARGs, on the contrary further expands it. The ARGs actually increase and there is no AMR reducing benefit when probiotics are used in this manner. They also reported that ARGs are also present in some of the commercially available probiotic bacteria themselves and there is a need to check them before commercial use. It is quite possible that future regulation may insist on all probiotic bacteria being screened for the presence of antimicrobial resistance genes.

In conclusion, there seems to be a lot of uncertainty on the role of probiotics being used concomitantly or soon after antibiotic treatment. It may be premature to come to any drastic conclusions or recommendations on the use of probiotics to mitigate antimicrobial resistance, but we need to be cautious and understand the new knowledge that is coming in, on the role of probiotic and gut bacteria in contributing rather than mitigating anti-microbial resistance.

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REGULATORY VIEWPOINT

AUTHOR

Dr Joseph I Lewis,
Chairman, Regulatory Affairs,
PFNDAI



In a recent ruling the EU Court of Justice (ECJ) annulled the ban imposed by the European Commission on TiO₂ (E 171). The scientific opinion relied upon, did not consider the toxicity due to particle size and therefore did not include the most relevant safety studies. The judges said the Committee for risk assessment, committed a “manifest error in its assessment,” as the scientific study justifying the ban didn’t take into account “relevant factors.”

Instead of a judicial review pointing this out, such a finding should have been observed by the Commission before issuing the ban. It should have noted that the risk assessment did not consider the particle size in its hazard identification statement (first step in risk assessment). The subsequent human exposure (third step) was also unrelated to exposure from foods. Basically the risk assessment was faulty. The UK, US and Canada food authorities all

regard food grade TiO₂ as safe for consumption under conditions of use.

There was another judicial case on “long term health risks” to young children consuming pureed fruits and vegetables even if they didn’t contain added sugars. The concerns raised are release of sugars from its cell walls making them more available and readily absorbed. Several other issues surrounding pureed foods in pouches relate to tooth decay. Questions raised by the Judge was at what point sugar content crosses into harmful levels and even if harm exists with such foods, would they outweigh any potential benefits.

In both cases it is the quality of a proper risk assessment that is emphasised. In the first case - TiO₂- it was a weak hazard identification, and in pureed foods the supporting evidence appeared largely from speculative research and hypothetical scenarios. The courts cannot rely upon statements such as “may lead to long term health risks” or “may be harmful if overly relied on by parents” or “can be a gateway to bad long term snacking habits and routine overeating”. Widely held reasoned opinions too require validation through scientific

risk assessments. It is a process of law. The Courts merely flagged the regulatory obligation to consider relevant science before setting standards or regulations.

During the pandemic, a consistent message given was “follow the science”; except that it was not just a quote, but a call for ‘disciplined’ action by those involved. For science (risk assessment) to precede executive actions (regulations), it must be embedded in legal procedures (Acts) to legitimize decision making. Such modern science-based food safety systems are available: the Food Safety and Standards Act (FSSA, 2006), the European Food Safety Act (EFSA, 2002), Codex Alimentarius, US, Australia, New Zealand use similar frameworks. The regulation on transaction of business sets out a format (Schedule I) for the Scientific Committee and Panels to provide its scientific opinion, and which subsequently for purposes of transparency, published on FSSAI website. Opinions in the prescribed format, if made, are yet unavailable.

These judicial responses hold the regulator responsible to accepting disciplined scientific risk assessments and to reject inferential leaps of possible harm. To follow the science, we need to follow the Act.



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ADDRESSING MICRONUTRIENT DEFICIENCIES IS A SOCIAL RESPONSIBILITY FOR THE FOOD INDUSTRY



AUTHOR

Mr. Prashant B Bhat,
Chief R&D Officer - Mother Dairy,
Fruit and Vegetables Pvt. Ltd.

We have 6 micronutrients that have been of concern in India of which Iodine has been taken care through an effective fortification in common salt. Though it is

not mandatory to fortify other forms of salts like black salt/rock salt etc, the penetration of packaged

common salt into the household is very significant which helped in addressing this deficiency. But the same doesn't apply in the case of other micronutrients where the fortification is not mandatory that include Iron, B12, Folic Acid, A & D.

Deficiency of these micronutrients has an impact not only on health but also on the economy. Its economic impact is not usually quantified. Our most productive age is between 16-50 years.

For India to multiply the GDP, it is essential for this productive age group to perform to its peak level. But in reality, nearly 50 % of females and 25 % of males in this age group are anaemic.

In such scenario, how they can reach their highest performance level if these deficiencies persist?





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packaged form of milk that we sell in Delhi through milk booths. Both Vit A & D were

The reason for this high incidence of anaemia is our daily diet. We are a predominantly vegetarian population and there are only a few rich sources of Iron, B12 and Folic Acid in our daily diet. Even among the non-vegetarian population, the frequency and quantity of consumption of non-vegetarian food is not adequate. So it becomes essential for the Food Industry to take a lead in fortification of this group of micronutrients. There have been efforts around this through wheat flour but a large part of India still uses chakki atta where fortification is not possible. Also the consumption of rice in India is much higher than any other cereal and we are still at a nascent stage on rice fortification.

Now coming to company's efforts on fortification, we have been pioneers in this area with decades of experience.



later introduced in our cooking oil and then in pouch milk few years ago. This ensures that we reach these very important micronutrients to more than a million households on a daily basis.

There are sometimes concerns raised around over-dosage of these micronutrients. These concerns are actually uncalled for. FSSAI has clearly regulated the dosage of these micronutrients to be used in different product formats,



which typically deliver around 15 % of RDA ([FSSAI, 2021](#), [NIN, 2020](#)) per serving. Also the tolerable limits of these micronutrients is 800-1000% more than the RDA ([HSPH, 2023A](#) & [2023B](#)). So practically, there is no issue of over-dosage.

Fortification of Milk with Vit A & D is easy to implement and doesn't need any additional infrastructure within the plants. The cost is not more than 2-3 paisa per litre. Almost every household in India buys milk daily and it gives a great opportunity to the dairy companies to deliver these micronutrients to very large masses addressing the deficiencies.

In-fact fortification should be considered as an important social responsibility by the Food Industry. It can be delivered with very minimal cost and will result in huge economic benefit to the nation.





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- Drinking water as per IS 10500
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FRUCTO-OLIGOSACCHARIDE (FOS): TECHNOLOGY, HEALTH BENEFITS & APPLICATIONS

AUTHOR

Prof Jagadish Pai,
Executive Director, PFNDI



People world-over have been consuming too much of sugar and calories, too less of dietary fibre and very little physical activity. This combination has caused many health problems called non-communicable diseases and increased the incidence of heart diseases and diabetes among other diseases.

Relevance of FOS and Market: Indian consumption of sugar was the highest in 2021-22 larger than Europe and the US put together ([Statista 2023](#)). Although per capita consumption in India was stagnant for some time at around 19 kg per year, compared to the global average of 23 kg per capita per year, it is still too high ([Economic Times 2023](#)). The reasons for this increase among Indians are 1) Increased

insulin resistance, 2) Stronger genetic factors and 3) Environmental factors caused by urbanisation ([V Mohan 2004](#)).

Indians love sweets and it is very difficult to control the sweet tooth especially when it festivals, celebrations etc. Health professionals have been cautioning about diabetes.

India is currently second only to China in diabetes epidemic with over 77 million people

afflicted. It is also estimated that large number of adults with diabetes are undiagnosed ([Pradeepa & Mohan 2021](#)).

Indians need to reduce sugar consumption and consume dietary fibre too. This combination will help control sugar and heart related problems. This is possible with the use of FOS or fructo-oligosaccharides, which not only provide sweetness to foods but also is dietary fibre with many health benefits.

Growing use of FOS in various sectors including food and beverages, dietary supplements, animal feed and pharmaceuticals due to many advantages for health and lifestyles is driving the market growth. The market was about USD 500 million in 2018 and is estimated currently to be over USD 2.5 billion and is expected to be over USD 4 to 6 billion by end of this decade. ([Verified Market Research, 2021](#) & [Adroit Market Research, 2018](#))



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SCAN FOR

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FOS are mostly composed of 1-kestose (GF2), 1-nystose (GF3) and 1- β -fructofuranosyl nystose (GF4) which all have 1 to 3 fructosyl

units (F) bound to sucrose molecule (GF) as shown below. (Michel et al. 2015)

The presence of β -glycosidic linkage makes FOS non-digestible by human gut enzymes. Colonic bacteria however can ferment them to produce short chain fatty acids and contribute to about 1.5 kcal/g. While reducing caloric contribution they also impart sweetness so reduction in sugar is possible. The calories contributed are different from those gained from digestion of starch or sugar. These short chain fatty acids help in wellness and health.

When such oligosaccharides are consumed, the undigested portion serves as food for “friendly” bacteria, also called probiotics such as Bifidobacteria and Lactobacillus species. These oligosaccharides can thus be called “prebiotics”. Asparagus, sugar beet, garlic, chicory, onion, Jerusalem artichoke, wheat, honey, banana, barley, tomato and rye are natural sources of Fructo oligosaccharides. However these foods are not consumed in significant quantities or regularly so as to give health benefit to the consumer.

How are Fructo-oligosaccharides Prepared?
(Martins et al. 2019)

There are small amounts of FOS and other oligosaccharides present in nature in many common foods. They are present in fruits, milk, honey, sugarcane juice, sugar beet, soybean, mustard, garlic, asparagus, onion, banana, tomato and other foods.

These could either be extracted from plant sources but very commonly they are prepared by microbial fermentation or from polysaccharides hydrolysis using chemical or enzymatic reaction. Inulin is a very common polysaccharide composed of fructose units and is present in chicory root.

What are Fructo-oligosaccharides or FOS? (Kherade et al. 2021)

Fructo-oligosaccharide is like other oligosaccharides are carbohydrates with molecular weight in between sugars and polysaccharides like starch and inulin. Oligosaccharides are composed of sugar units linked together to form a small chain of commonly about 3 to 7 sugar units. Glucose, fructose, galactose etc. commonly link in many natural foods to form oligosaccharides. When fructose units link to each other, with occasionally one glucose unit at one end, the fructo-oligosaccharides are formed.

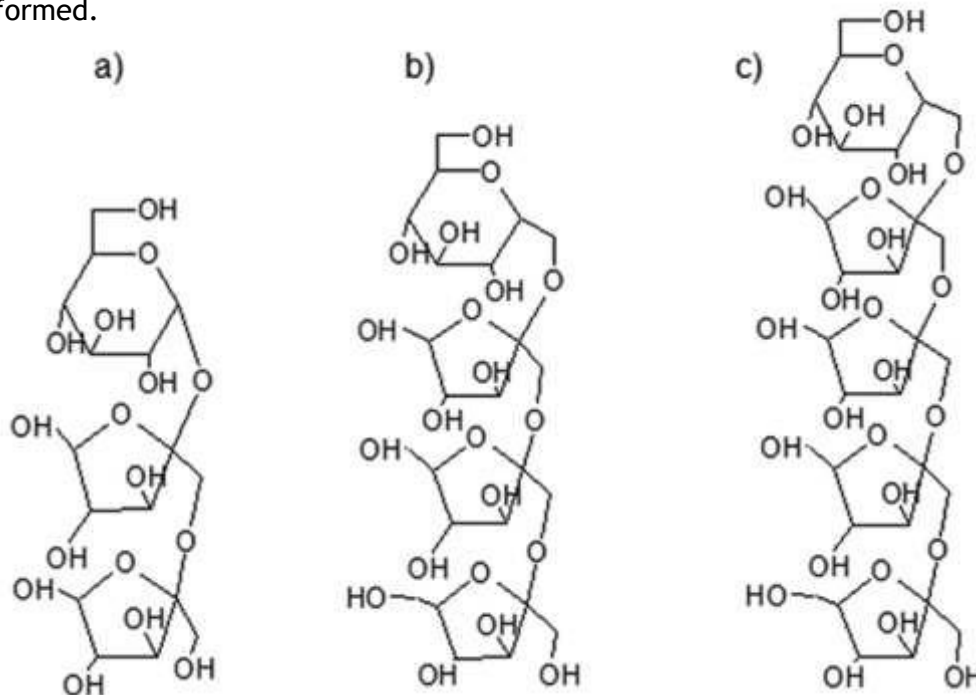


Figure: FOS, (a) 1-kestose, (b) 1-nystose, and (c) 1- β fructofuranosyl nystose.



This can be partially hydrolysed by using chemicals or enzymes to produce a mixture of different fructose-oligosaccharides of different lengths.

It is also possible to use enzymatic synthesis to produce short chain FOS from sucrose. The enzyme β -fructofuranosidase or β -D-fructosyltransferase could be used to carry out this conversion called transfructosylation reaction. The conversion is also done using enzymatic synthesis using microbes like *Aspergillus niger*.

Health Benefits of FOS ([Khanvilkar & Arya, 2015](#) & [Healthline, 2017](#))

FOS are mostly used as low calorie, alternative sweetener to reduce consumption of sugar in order to control blood sugar and weight. They are prebiotic and may protect against unhealthy bacteria. They may decrease cholesterol levels and are non-cariogenic.

FOS produces soluble fibre effect with various benefits due to that including reduced gastrointestinal transit time, increased fecal weight, reduced plasma cholesterol, delay of glucose absorption from gut and reduce the risk of gastrointestinal diseases. It encourages the growth of favourable bacteria in colon and discouraging growth of unhealthy bacteria. Colonic

fermentation lowers the pH facilitating absorption of minerals including calcium and magnesium.

Advantages of short chain fatty acids produced by probiotics growing on FOS as food

SCFAs help in regulation of sodium and water absorption, and can enhance absorption of calcium and other minerals. SCFAs lower the colonic pH, which is not conducive to the growth of potential pathogens (disease causing bacteria) for example, *Helicobacter pylori* is able to grow in acidic environment.

Moreover, these short-chain fatty acids act as signalling molecules, stimulating the release of the satiety hormones namely glucagon-like peptide-1 (GLP-1) and peptide YY (PYY). SCFAs thus help indirectly reduce appetite and food intake, a step which prevents body weight gain and, in turn, the risk of metabolic disorders including type 2 diabetes. The hormone GLP-1-mediates increase in insulin secretion thus regulating blood glucose concentrations ([Portincasa et al., 2022](#))

Inulin and FOS have also shown prevention of colon cancer. In one animal study ([Pool-Zobel et al. 2002](#)), it showed prebiotic effect with proliferation of bifidobacteria and other bacteria possibly resulting in observed anticancer effects.

All the above benefits certainly would provide some relief for people who love sweets, are afraid of diabetes,



dental caries, obesity as well as heart diseases. However, there are some limitations as excess daily consumption of FOS is also not advisable as it may lead to diarrhea and bloating which is known for other soluble dietary fibres.

Properties of FOS for Food Applications

FOS has high solubility in water so can be easily used for food applications e.g. functional beverages, desserts and sweets, baked goods and many milk products. FOS exhibit less sweetness than sucrose. They are about one third to half as sweet as sucrose. They could partially replace sugar and be used with other sweeteners. Since larger quantities of FOS are needed for sweetness, they could be used as bulking agents when used along with high-intensity sweeteners.





FOS solutions are more viscous than with sugar. This is advantageous in functional beverages, desserts and sweets especially based on milk. People prefer thicker beverages and shakes. It also provides better body and mouthfeel than watery products.

FOS have greater thermal stability than sucrose over a large range of pH from 4 to 7. It undergoes less browning than sugar. Thus, they could be used with other sweeteners when higher sweetness is needed. In other words, they could be used in many different ways in many different food products for making them healthier.

Applications in Food Products

FOS are used in many fields including agriculture for animal feed, in pharmaceuticals for making medicines more tasty as well as for the physiological properties, but the most exciting applications are in food industry. People are used to sugar which not only imparts sweet taste but also improves the overall sensory perception. It rounds off the taste when other substances

imparting taste sensations are not balanced. So replacing it is a very big challenge and FOS has the potential as it not only has the desirable sweetness, it does not have the unpleasant aftertaste and on top it can provide so many other health benefits to food products besides taste. ([Kherade et al. 2021](#))

Before developing a food product with FOS, it must be realised that it is not one substance but a group of substances with different chain lengths and slight differences in chemical structures. These not only have slight differences sweetness intensities but also properties like viscosity that may affect the making of food products and sensory properties of final product.

Many different products have been prepared using FOS including frozen desserts, baked goods, breakfast cereals, fillings, dairy products, fruit products, dietetic products and meal replacements. FOS is used for sugar and fat replacement, moisture retention, improvement in texture, for improving taste perception of other sweeteners, to improve crispiness, as well as for improvement of shelf-life.

Yoghurt is one of the best food systems where use of FOS has multiple advantages.. The supplementation of both goat and cow milk with either FOS

or Inulin improved both the growth and survival of the probiotic cultures in the resulting yoghurts along with its dietary fibre action. ([Celestin et al., 2015](#)), Addition of FOS in soy-fermented probiotic milk resulted in improved taste, texture and faster fermentation. The survival of the probiotics was also improved with higher number of viable bacteria after storage, ([Mishra & Mishra, 2012](#))

Finally

Fructo-oligosaccharides have a lot of potential for applications in food industry. Because of its contributions in taste as well as health benefits more food products are using them for variety of reasons. Regulators have also realised the benefits so they have permitted them in food products. Consumers and health professionals are becoming aware of their advantages. All this has increased the market of FOS globally. Even in India, many products including various traditional sweets are now available in which FOS are used for their sweet taste and as dietary fibre. There is also scope for research in several fields for FOS. Not only developing foods with FOS but also preparation of FOS, study of properties of FOS, metabolism and physiology which affect the various health benefits of consumption of FOS will be studied by researchers.



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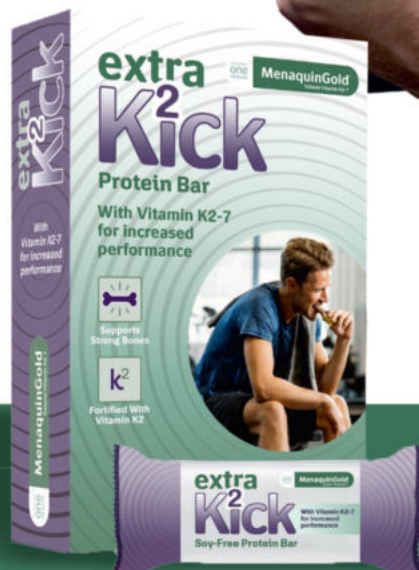
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REDEFINING SALT -

NEW TRENDS SHAPING THE WONDER INGREDIENT



AUTHOR

Mr Martin Jojo,
General Manager –
Salt – FBD, ITC Ltd

Those who think a fascination with salt is a bizarre obsession have simply never owned a rock like this- Mark Kurlansky - Salt a world history

Plato described it as especially dear to the gods, Homer called it a divine substance. Salt has shaped civilization from the beginning, and its story is a glittering, often surprising part of the history of mankind. Wars have been fought over salt and, while salt taxes secured empires across Europe and Asia, they have also inspired revolution -Mahatma Gandhi's salt march in 1930 began the overthrow of British rule in India that was Hi-Losphy on salt. Chemically, Salt is the only

rock edible for humans, it comprises of about 40% sodium and 60% chloride, salt flavours food, acts as a preservative, binder and stabilizer.

The human body requires a small amount of sodium to conduct nerve impulses, contract and relax muscles, and maintain the proper balance of water and minerals. Essentially, salt helps in keeping our mind and body balanced and sane.

The post pandemic world has brought about a myriad of changes in the way people consume cookies to their heart's content, from seeing a shift from health and immunity race to sensory indulgence, from kitchen being the most visited place to the least needed space, from cleaning and doing chores at

home being the biggest pastime to just getting away from their daily chores and the most talked about work from home rather than work from office culture.



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the households and thus crystal salt found new takers and brands aptly started offering iodized crystal salt in their portfolio.

As we head towards endemicity, nutritional habits too are unceasingly gaining more attention and reshaping the relationship between food and quality of life. What to eat, Where to eat, When to eat & Why to eat are the questions more asked than consuming food. Conversations around newer trends are influencing choices and this little rock -salt is not left behind with newer trends shaping the white, black, pink, red, blue and what not more coloured crystals.

Let's look at the major trends re-defining this wonder ingredient

a. from CRYSTAL to POWDER to CRYSTAL & FLAKES-

traditionally salt used in households were in unrefined crystal form (>5-8 mm crystals) irregular in shape. The salt crystals were crushed in the traditional mortar and pestle with certain specified days of the month suited for this activity.

Salt being considered as a source of energy, the women folk considered the grinding activity as a pious ritual and were mindful of the same. Urbanization and industrialization coupled with advancement in refining technology & compulsory iodization led to the migration of salt in powdered form with granulations ranging from 100-1000 microns. The pandemic brought about a resurgence of traditional food practices in

In addition to this, the food services sector is playing a key role in defining the trends in the ingredient space. Ever changing consumer landscape on the back of Increased organized presence of ethnic cuisine restaurants - Korean, Thai, Japanese etc. and the fact that more Indians are travelling all over the world and returning with their palates pleased and tempted by the exciting locale flavours. This exploration of food outside of the conventional gamut is the catalysis for exotic ingredients, where-in people are ready to play around with foreign recipes at home too- flake salts, fleur-de-sel, Korean Bamboo salts are the new niche trends taking shape currently in the salt space.

b. from WHITE (Sea) to BLACK to PINK, BLUE, RED (Rock) & Lake salts-

India boasts of a benevolent 7500 km coastline and produces 26-28 MMT of salt in a year of which >95% is sea salt formed by the evaporation of sun and wind energy. Gujarat produces 80% of the salt requirement in India with TN a distant second at 9%. Sea salt has been the dominant salt source in the country and hence the regular white table salt has been enjoying the seat at Indian kitchens and tables. Black salt (bit loona, bit lobon, kala loon, sanchal, guma loon, or pada loon) was the only other salt consumed owing to the

characteristic Sulphurous pungent odour and usage on fruits and salads. Black salt is a kiln fired salt made through a reductive chemical process that transforms some of the naturally occurring sodium sulphate of the raw salt into pungent hydrogen sulphide and sodium sulphide. This involves firing the raw salts in a kiln or furnace for 24 hours while sealed in a ceramic jar with charcoal along with small quantities of Triphala (harad seeds, amla, bahera, babul bark, or natron). The fired salt melts, the chemical reaction occurs, and the salt is then cooled, stored, and aged prior to sale. Post Covid world saw a range of new salt colours in the Indian kitchen with Himalayan Pink salt (Saindhava Lavana, halite, rock salt) being the winner, opined as the healthiest salt being mentioned in the Charak Samhitha (foundational text of Ayurveda) as the ideal combination for Ayurvedic medicine preparation. Persian blue and Hawaiian red are the niche entrants in this space.

Continuing with the trend resurgence theme Lake Salt - Sambhar salt is trying to gain acceptance, sourced from the Sambhar Lake in Rajasthan Lake salt is termed as naturally iodized alkaline salt, supposedly the only salt in the world with a pH level of around 9.5 and hence possessing several therapeutic values. The unique algae present in the sambhar brine gives the salt a characteristic odour along with the pink colour and is responsible for alleviating the pH levels in the salt.

c. from IODINE to IRON to VITAMIN/s fortification-

Universal salt iodization (USI) was recognized as the most promising, sustainable, and cost-effective solution to address iodine deficiency in the country. Iodine, an essential micronutrient required for normal thyroid function, growth, and development. Suboptimal intake of iodine causes inadequate thyroid hormone production, leading to a spectrum of adverse outcomes, collectively termed iodine deficiency disorders (IDDs). In 1983, the government made a historic policy decision to strive for USI and permitted the commercial production of iodized salt by the private sector subsequently making it mandatory iodine fortification for any edible salt sold in India.

The wonder ingredient - salt has the below major advantages making it qualify as the most optimal carrier of any deficient nutrients or minerals

1. Cheapest carrier with >95% branded penetration
2. Bleak chances of over and lower consumption hence not leading to over and under dosages.
3. Dosages can be lowered owing to consistent consumption during all the meals of the day.

Post the success of USI, Government of India is focusing on food fortification with iron as a viable alternative, and the provision of double-fortified salt (DFS; with iron and iodine) has been mandated in public health programs for the alleviation of

iron deficiency through supplementation, the next trend in this area is the fortification of vitamins along with Iodine as an opportunity to address vitamin deficiencies viz B9-folic acid, B12, B1 & D2 and mineral deficiencies of calcium and zinc.

d. from Na (Sodium) to LoNa (Low Sodium) to Super LoNa (Super Low Sodium) -

salt in its original avatar had only one role, to deliver saltiness period. Religions texts too echoed the same “You are the salt of the earth, but if salt has lost its taste, how shall its saltiness be restored? It is no longer good for anything except to be thrown out and trampled under people's feet” The Holy Bible

The onset of industrialization, globalization and the consumption economy brought with it changing dietary habits and thus came the urge of lowering the salt intake but not impacting the saltiness. This gave an opportunity for marketers and Product Development experts the race to discover a Sodium lookalike salt, with all the goodness of saltiness and no trace of sodium. Till date there has been no mineral salt discovered, developed which is capable to ape the marvel - Sodium Chloride (NaCl), however a distant cousin Potassium Chloride (KCl) was pipped as the best alternative for regulating sodium intake



Redefining Salt - New trends shaping the WONDER INGREDIENT



and used as a blend with NaCl termed as Low Sodium Salt. KCL being a metallic salt, if added in excess renders a metallic note creating dissonance. 10-15% Low Sodium salt blends are currently available in the market.

The next shift in this space is improving formulations with varying size of KCL crystals and advanced blending techniques to increase the range of KCL from 15% to 30% and target to mask the metallic note thus offering a super low sodium alternative to deliver less sodium more saltiness per grain.

e. from Na & Cl to Ca, Mg & SO₄²⁻ to 84 minerals & sodium ion –salt

predominantly is composed of sodium and chloride, of which, sodium was believed to aid the saltiness perception on the tongue while its core usage is predominantly making any food edible. As raw salt production and harvesting techniques matured with the onset of “measurement of Bohme” in the salt works and improved gravity designs, the importance of other downstream chemicals after complete separation of sodium chloride viz. calcium, magnesium and sulphates went up and were used to derive gypsum, chlorine and bromine-based products.



Consumer's shift to rock mined salt - Himalayan pink salt have garnered interest since 80 trace minerals have claimed to be in the rock mined salts giving numerous health benefits, although dietary claims are unsupported by rigorous clinical research. As for industrial applications, the biggest shift currently in the WIP stage is the replacement of sodium-ion batteries (salt being the source, abundant and cheap) once commercialized from the currently used lithium-ion (scarce mineral) batteries believed to be the next biggest disruption in the EV space.

f. from PFA to FSSAI to HFSS

- regulation space on salt too have traversed a long journey, erstwhile Prevention of Food Adulteration Act (PFA)act specifying only Edible common & iodized salt standards with a separate standard of refined iodized salt fixed by the salt department to the onset of FSSAI regulations, harmonizing all standards under the section 12 : salt (including edible common salt, iron fortified salt, iodized salt) and salt substitutes, separate standards on Iodine and Iron + Iodine fortification and use of the +F logo for labelling and the Food Products and Food Additives regulation specifying the standards on anti-caking agents and crystal modifiers. High Fat Sugar Salt (HFSS) - Eat Right India is the next big shift in the food labelling regulation as a measure for

reduction of fat, sugar and salt in the Indian dietary regime. This is governed by a mathematical formula on which star ratings will be calculated and also in the manner in which they will need to be displayed on the front labels of the products and is currently proposed to be voluntary in nature for four years upon notification.

g. from Outside the Shop to Behind the shop to Over the counter

- the old adage "true to your own salt" is a belief which means, borrowing salt makes a person indebted and loyal hence people avoid, if required in dire situations, a token amount in lieu of this is given to qualify it as a financial transaction and not a freebie. Since borrowing salt itself is a taboo, stealing it is believed to bring in financial misery and doomsday hence salt bags were always stocked outside the shops.

The advent of newer refining capabilities, technological interventions in improving quality coupled with Investments on packaging, brand building and marketing communication made it one of the earliest FMCG categories to be >95% branded giving it space behind the shop in warehouses. Shifts in consumer preferences driven by a

consumption and digital economy has enabled premiumization in the category bringing it on to the shelves with prominent display and planogram and variants being labelled as Organic, wellness, health & nutrition.

h. from salt to COOK to salt to WASH to salt to

REMEMBER- cooking had always been the main stay uses for salt. The right amount of salt in food is never appreciated however, an absence or extra amount is always a dissonance leading to discarding the food. During Covid, salt did find an increased utility as a washing aid, powder and crystal salt both were increasingly used to wash anything and everything from vegetables to food packets to Amazon couriers. Anti-microbial property of salt and it's ability to remove most of the contact pesticide residues that appear on the surface of the fruits and vegetables catalyzed use of warm salt solution for washing during the pandemic. Cut 2022 a post Covid world fuelled start-ups in this space (Himshakti, Arqa - infused collections, sprig, artisan palate) propelling the idea of using salt and fusions as gifting solutions and collectibles (fleur-de-sel, Korean bamboo salt, Hawaiian salt).



i. from a **COMMODITY** to a **STATEMENT** to an **INDULGENCE**- As far back as 6050 BC, salt has always been an integral part of the world's history, as it has been interwoven into countless civilizations. Used as a part of Egyptian religious offerings and valuable trade between the Phoenicians and their Mediterranean empire, salt and history have been inextricably intertwined for millennia, with great importance placed on salt by many different cultures. Salt was highly valued and its production was legally restricted in ancient times, so it was historically used as a method of trade and currency. The word "salad" also originated from "salt," so is the word "salary".

The journey of this rock from being discovered by

Alexander's army as their horses licked the ground to a statement of "satyagraha" against the British Empire's infamous "Salt Tax" that gave impetus to the Indian independence movement to a flavour of indulgence for food connoisseurs.

These shifts will surely ladder premiumization in the category and accentuate value from an erstwhile volume play. Leading brands and gauging these trends are extending their range of salt offerings. The role of industry, academia & regulatory bodies to drive quality standardization among the variants, and harmonization of labelling and claims for these salts would play a key role in ensuring the consumer is making an informed buying decision.

Quality standardization and devising quick tests is also critical for addressing possible adulteration of the higher value salt with an inferior origin or a different brine source.

With a pinch of salt (pun intended) only used, time would only tell how the consumer dilemma on brand stickiness v/s variant stickiness would play out and these trends would eventually take shape as norms or fizzle as mere fads.



COMING EVENTS

Vitafood's Europe
Online: May 1- 12, 2023
May 9-11, 2023, Geneva,
Switzerland
Info: <https://www.vitafoods.eu.com/en/home.html>

Cold Chain Asia
Jun 9, 10, 11, 2023
Bhrikuti Mandap Exhibition Hall
Kathmandu, Nepal
Info: www.coldchainasia.com

**Inter Food Tech
Snack & Bake Tec**
Jun 7 -9, 2023
Hall 1, Bombay
Exhibition Centre, Mumbai
Info: www.interfoodtech.com
www.snackbaketec.com

Bakers Technology Fair 2023
July 05-07, 2023
Coimbatore
Info:
www.bakerstechnologyfair.com

**5th International Conference on
Food Nutrition Health & Lifestyle
2023**
July 27 - 27, 2023

Kuala Lumpur, Malaysia
W: <https://nutritionconference.co/>

14th Edition India Foodex 2023
Aug 25 - 26, 2023
BIEC Bangalore
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E: indiafoodex@gmail.com
W: www.indiafoodex.com

**Anutec
International FoodTec India**
Sep 07 - 09, 2023
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DRYING OF FRUITS AND VEGETABLES



AUTHOR

Ms Nithyakalyani V.
Food Technologist,
PFNDI

Drying is an age old practice used for preservation of foods, where the food item is exposed to heat or hot air to remove the water present by evaporation. As the moisture is reduced, the changes due to microbial and enzymatic reactions are controlled so the food can have an extended shelf life.

Dehydration is another term used to denote the removal of water from the food substance.

Drying versus Dehydration

Drying is a natural process where the parameters depend

on the environment and cannot be controlled, it is economical and requires more space with added danger of contaminants like dust, insects and birds, so quality of final product may be compromised.

Dehydration is an artificial process where parameters (both process as well as hygiene) can be controlled, it is expensive and requires less space and results in good quality of the final product.

Once the moisture is removed the product has reduced weight and is smaller in size thus making packaging and transportation easier. The dried or dehydrated product can be reconstituted by just adding water.

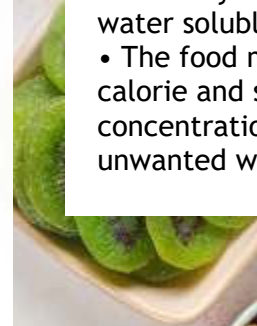
Why should fruits and vegetables be dried?

Fruits and vegetables have a

very short shelf life and can be wasted if not consumed when freshly harvested, Drying helps to preserve them for a longer time and makes them crunchy, tasty, nutritious, lightweight, easy to prepare, store and use. Certain seasonal fruits and vegetables can be made available throughout the year by drying them.

Disadvantages of dried/dehydrated fruits and vegetables

- Texture, colour and flavour features may be modified and on reconstitution, the product may not resemble fresh food.
- Since there is loss of water, there may be some losses of water soluble vitamins.
- The food may have high calorie and sugar concentration and may cause unwanted weight gain.



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ADVANTAGES:

- Ensures look, color, texture, taste of products are retained
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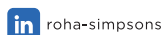
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Preparation of fruits and vegetables

1. Selection: For dehydration process, ripe, unbruised fruits and vegetables of peak eating quality are chosen.

2. Shape and size: Depending on the final product the fruits and vegetables that are bigger in size are either sliced, cut into rings or pureed. The slicing must be of uniform thickness for better drying.

3. Washing: Certain herbs, berries and seedless grapes need to be washed and cleaned before drying.

4. Prevention of browning: Steaming, sulphuring or coating light coloured fruits with ascorbic acid, lemon juice prevents browning.

Vegetables can be steamed or blanched to inactivate enzymes that cause them to mature, change colour and become tough on drying. Blanching involves dipping the vegetable /fruit into boiling water for up to 5 minutes and then cooling them by plunging them into ice-cold water.

What is sulphuring? This is an optional phase done to preserve the colour of the fruit. The fruit is placed in tent or cabinet where Sulphur is burnt liberating SO₂ that is absorbed by the fruit. The gas

is corrosive and toxic so the place has to be well ventilated. If consumer prefers naturally dried fruit this process is skipped.

The fruits and vegetables are now ready to be dried.

The Drying Process:

Selecting the right drying method and equipment:

Several methods are available commercially to dehydrate fruits and vegetables but an optimum choice of the process and equipment has to be made considering the quality requirements, raw material characteristics, and economic factors.

Drying Process can be divided into three types:

- sun and solar drying
- atmospheric dehydration including stationary or batch processes
- Sub-atmospheric dehydration

Sun/Solar Drying: It was one of the earliest methods used for preservation of fruits and vegetables. Here the food is dried directly under the sun or in shade (diffused sunlight). This method works well in tropical and sub-tropical climate where there is plenty of sunshine. Fruits are preferably dried by this method as they have higher sugar and acid content and do not spoil while sun drying, but vegetables having low sugar and acid content may spoil during the drying process and may not be good candidates for sun drying.

Raisins, apricots, figs are



largely produced by sun drying. Sun dried tomatoes are now gaining popularity.

Solar dryers can also be used where the product is not directly exposed to sun but dried by exposing it to air that is heated by solar energy. Solar drying utilizes black-painted trays, solar trays, collectors, and mirrors to increase solar energy and accelerate drying.

This is a simple process with low capital investment but totally dependent on environmental factors, along with hygiene issues due to exposure to dust, insects and birds, shelf life is also lowered as moisture level cannot be brought below 15-20%.

Atmospheric forced air Dryers-This is the most common method of drying fruits and vegetables. Here fruit/ vegetable to be dried is exposed hot air under controlled relative humidity conditions. To save energy and costs the air is constantly recycled. These dryers can be further classified as Stationary or batch dryers namely, tunnel, spray dryer and drum dryers.



Tunnel dryers are efficient, flexible and the most popular equipment used for drying fruits and vegetables though they involve higher labour costs for loading and unloading. The fruit/vegetable is spread on trays and stacked on trolleys, which are passed into a tunnel where hot air is circulated co currently or counter currently. The dried product is collected at the end of the tunnel.

Spray Dryers: Fruit and vegetable juices can be preserved in the powder form by spray drying them. Consider the manufacture of tomato powder. Once the tomatoes are procured, they are cleaned, sorted, sliced, cored and trimmed.

Following this, their juice is carefully extracted and filtered. This filtered feed liquid is sprayed into a chamber in the form of fine droplets (atomization). Hot air is circulated in the chamber either in co current or counter current direction. The feed is dried in a matter of a few seconds and converted to solid tomato powder.

Advantages of using a spray dryer are that it can be used continuously for large scale, processing, has low labour costs, quick drying rate (making it ideal for drying heat sensitive items), its maintenance and operation is relatively simple. On the downside, the capital costs are very high and the feed needs to have high moisture content so that it can be atomized easily.

Sub atmospheric or vacuum dehydration:

These dryers make use of vacuum to bring down the boiling point, such that moisture is removed under ambient conditions.

Vacuum shelf, vacuum drum, and vacuum belt dryers are one category where moisture loss happens from liquid to vapour phase. Tropical fruit, such as bananas, mangoes and pineapples can be dried using vacuum, so as to provide an exceptionally sweet and flavourful fruit chip snack product which is free of any additives such as frying oil, preservatives, added sugar and artificial sweeteners.

Freeze dryers are another category where loss of moisture is by sublimation where ice is directly converted to vapour.

Since these dryers have high installation and operating costs they are restricted for use only for raw materials that are sensitive to heat and oxidation.. Powdered soup, fruit in breakfast cereals, fruit juices, extracts from blackcurrants and other fruits, culinary herbs can be prepared by freeze drying.

The advantages of freeze drying are high flavour retention, maximum retention of nutritional value, minimal damage to the product texture and structure, little change in product shape and colour, and



a finished product with an open structure that allows fast and complete rehydration. Disadvantages include high capital investment, high processing costs, and the need for special packing to avoid oxidation and moisture gain in the finished product.

Post dehydration Treatment

Depending on the intended product dried fruits and vegetables are subjected to different treatments which includes:

- **Sweating-** Here the dehydrated fruit or vegetable is held in bins until moisture is equalised.
- **Screening-** Dried fruit/vegetable is screened for unwanted size, foreign and discoloured materials.
- **Instantization-** used for product with low moisture content, to improve its rehydration rate.
- **Packaging -** for both dried fruits and vegetables the packaging should protect the product from heat, light, moisture, retain all its physical features up to the time of consumption and the packaging material should be approved for usage for foods.

The dehydrated products can be packed in cans, plastic bags, drums, bins, and cartons depending on how it is finally going to be used.



EXAMPLES OF DRYING PROCESS

Dried okra:

The pods are cut into slices (around 5 mm. thick) after being washed thoroughly with cold water. For preservation purposes and in order to keep the green colour, blanching is carried out, then it is wrapped in a clean piece of cloth and dipped for three minutes in boiling water containing 50 g salt per litre of water and 3 g potassium meta-bi-sulphite per litre of water. The blanched okras can then be washed with cold water to remove the slimy material produced by boiling. The product is then drained and finally placed on the trays of a drier. Final moisture content is around 4-5%, while storage life is around 12 months.

Dried Banana

The fruit should be ripe and sweet, but not soft and brown. It is cut into thin slices (5-7mm thick) and is dipped in a 2000 ppm SO₂ solution for 1 minute. The fruit is dried in a single layer at 60-75°C until hard and brittle (equal to moisture content of 12%). Avoid overheating to prevent the banana from darkening.

Innovative Fourth Generation Drying Technologies

In the recent years, a lot of research to maintain a high quality of dried products has resulted in useful technological advancements in

the field of fruit and vegetable dehydration. Microwave drying, Heat pump drying, Refractance Window Drying, Fluidized bed drying and Radio Frequency Drying are some of the novel methods that reduce energy use, maintain the product quality and improve efficacy of drying.

Microwave Dryer: There is no external heat added in this type of dryer. It makes use of a magnetron, which produces microwaves. The entire process takes place inside an oven and the electrical energy used is of a frequency between 300MHz to 300 Ghz. These microwaves cause molecular oscillations in the food material, resulting in heat production, which helps in removal of moisture. Microwave combined with hot air drying of tomato, grape, potato chips, carrots and other vegetable products can improve the quality of products, with good rehydration and low shrinkage.

Fast volumetric heating, shorter drying time, higher drying rate, reduced energy consumption and lower operating costs are its advantages, while high initial costs for industrial dryers, partial loss of aroma, sensory, textural changes along with requirement of specific sample size and shape are the disadvantages.

Fluidized bed dryer: Air acts both as drying and fluidizing medium. The particulate article that is to be dried is kept suspended against gravity in a plenum chamber by air stream that is flowing upwards

through a mesh tray. Air is passed horizontally also to help the food pass through the dryer.

These dryers are compact and drying conditions can be well controlled here, thermal efficiencies and drying rates are also high but can be used only for small particulate foods that can be fluidized without causing any mechanical damage like for e.g peas, diced and sliced vegetables.



Heat pump dryer: consists of a conventional drying chamber with an air circulation system and the usual components of an air-conditioning refrigeration system. The drying air is dehumidified by the evaporator (cooling section of the refrigeration cycle) and reheated by the condenser of the heat pump. Heat pump drying is essentially a low-temperature process which can be controlled from -20 °C to 70 °C. Colour and aroma are better retained in this method. Heat pump dryer in combination with microwave and other drying techniques is used to dry apples, bananas, grapes, kiwi and pineapple.



Refractance Window Dryer:

Here the pureed material is evenly distributed on a conveyor belt which passes over hot water (95-97° C) and cold water sections. The material is dried as it passes through hot water and solidifies as it reaches the cold water section and can be scraped off from the belt. This technology is suitable for products with a distinct aroma and vibrant colour that are pureed or semi-solid. Using this method, fruits, vegetables and herbs with high moisture content can be dried in 3-5 minutes, while retaining their colour, vitamins and antioxidants.



Radio Frequency (RF) Dryer:

RF drying is a volumetric heating method where electromagnetic waves directly couple with food to generate heat. RF treatment involves heating with electromagnetic waves (10 to 300 MHz). Food quality is preserved by evaporating only

the water and heating it only minimally. RF dryer can be used in combination with conventional dryers to improve the drying efficiency and product quality.

It is evident that a plethora of drying techniques are now available and it is up to the food industries to choose the one which is best for satisfying the consumer preferences and also one that is environmentally sustainable.

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EGG

PROCESSING & TECHNOLOGY



AUTHOR

Ms. Samreen Shaikh,
Jr. Food Technologist,
PFNDI

many people. Although egg is a very nutritious product, there are some losses in the nutrients while processing & storage.

Nutrients in 100gm of raw egg.

Proteins	13 g
Fats	9 g
Carbohydrates	Less than 1 gm
Vitamins	Vitamins B1, B2, B3, B5, D, A, etc.
Minerals	Calcium, Phosphorus, Magnesium, etc.

Quality of Eggs: The quality of an egg is determined by the most effective method, which is Candling. In Candling, the internal quality of an egg is determined depending upon the inner condition of an egg. The cleaned eggs are graded in a candling booth, which is a dark room. A penetrating light is shined on the eggs to grade them. The egg should be free from blood spots, the yolk must have a strong outline, and the egg white must be

clear and thick. The outer quality is determined by the outer condition of an egg. The shell should be clean without any cracks. It should not contain any dirt or foreign material. The shape is also an important parameter, eggs should be oval in shape. Depending upon the quality, the eggs are graded into 3 categories as per the USDA system: Grade AA, Grade A & Grade B. [Agmark](#) in India has developed grades for eggs, which are even more elaborate based on the size of the eggs and the quality of white and yolk.

Applications of Egg in the Food Industry: Eggs are used in many food processing industries due to their functional properties like foaming, binding, emulsification, coagulation, leavening, thickening, etc.

Due to this reason, eggs have been used in many recipes and products:

- Eggs are used in bakery products like cakes, pastries, brownies, muffins, cookies, pancakes, etc whether as liquid eggs or powdered eggs.
- Egg yolk is used to make mayonnaise & salad dressings due to its emulsification property.

Egg processing is a huge segment of the food processing industry where eggs are processed into various forms and products, for human consumption. Egg processing includes the processing of a whole egg, or the processing of albumin, and yolk. Also, the type of processing involves freezing, dehydration, spray drying to powder, etc. Egg products are classified into liquid products, frozen products, dried and dehydrated products, or specialty products such as pre-cooked egg patties, egg pizza, freeze-dried scrambled eggs, etc.

Nutrients in the egg: An egg is one of the most nutritious foods that is consumed by

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- Egg powder is used as a substitute for whole eggs in bakery products.
- Egg white is used to make whipped cream. When the egg white is beaten it entraps air in it forming a foam.
- Eggs are used in custards and puddings. When used in custards, the heat coagulates the eggs and makes the custard firm.
- Eggs are also used in some ice creams and beverages like eggnog, cocktails, etc. In ice cream, eggs add rich colour and flavour, prevent ice crystallization and help produce smooth and creamy ice cream.
- Eggs act as thickeners and are used to improve the consistency of soups, curries, gravies, etc.

Processing of eggs:

At the farm:

- Laying of eggs- As soon as the hen lays the egg, they are gathered either manually or mechanically. Hens can lay up to 250-300 eggs per year. It takes 24-26 hours for a hen to produce an egg. The eggs may be fertilized or unfertilized. Only unfertilized eggs are used for human consumption.

At the egg processing plant:

- Receiving eggs- There is a very short time between when the eggs are laid and when they reach the egg processing plant. The proper handling of eggs is important, as it helps to prevent egg damage & minimizes loss of quality.
- Washing eggs- Eggs are

washed after receiving. Eggs are placed on the conveyer belt which carries eggs through detergent, sanitizer, water wash, hot water rinse, and finally through

a hot air dryer.

- Grading eggs- After washing and drying, eggs are graded to ensure internal as well as external quality. The Candling method is used for this purpose.

- Breaking eggs- Once the eggs are graded, all acceptable quality eggs are broken. Eggs are broken on an egg-breaking machine.

- Separation of eggs- After breaking, the extracted egg undergoes separation to separate egg white and yolk. Whites, yolks, or whole eggs go to the mixing and churning machines and are then chilled until processed. The plate heat exchanger is one of the methods used for cooling purposes.

- Pasteurization of eggs- Eggs are heated at a high temperature for a specific time and then cooled down rapidly. Pasteurization is done to protect the eggs against microbial contamination. After pasteurization, it is essential to handle the pasteurized egg product hygienically to prevent cross-contamination.

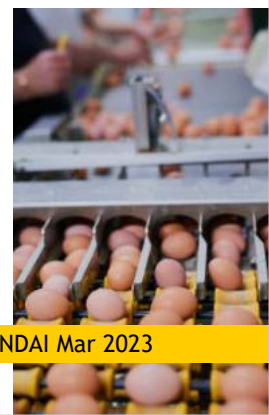
Egg products: There are various egg products like egg powder, liquid egg, frozen egg, etc.

- **Egg powder:** The spray drying method is one of the best and most commonly used methods for making egg powders. In spray drying, droplets of the liquid egg are formed by a nozzle or an atomizer, and then transferred to a drying chamber, where

incoming hot air causes the water to evaporate. The dried powder is then collected and packed. Egg powders can be made as whole egg powder, egg white powder, or egg yolk powder. Some egg whites are dried by the pan drying method in a hot air oven. These are in granular or flake form but can be grounded into a powder.

Apart from spray drying, there are various other methods used for drying eggs like freeze-drying, foam drying, etc. While making egg powder, glucose is removed from the egg white before drying. This is done via fermentation by adding yeast or by oxidation using glucose oxidase. This process is known as de-sugaring. Removal of glucose is important because if it is present during drying it will react with amino acids thus causing a browning reaction. There could also be the development of off-odours and loss of functional properties. Removal of glucose also improves the storage stability of the product.

To improve the flow property of egg powder, a free-flowing agent such as sodium silico-aluminate can be added up to 2%. The shelf life of egg powder as per the manufacturer is about 2 years. It is well known that high temperatures and long drying times cause a significant decrease in the nutritional quality of dried products. In the spray drying process, higher temperatures lead to the oxidation of colour pigments and cause



bleaching of the colour of whole egg powder. Cholesterol oxidation is more advanced when egg powders are stored at room temperature.

Storage at room temperature also generates a loss of retinol and tocopherol content, whereas storage at 4°C does not further damage powder properties. Whole egg powders are highly oxidizable products and their storage under vacuum conditions and in darkness significantly prevents the loss of polyunsaturated fatty acids.

- **Frozen egg:** Eggs are frozen in a blast freezer at -29°C to -40°C. After freezing the frozen products are usually stored at -18°C to -26°C. Eggs are frozen to preserve them for use in the food industry. Frozen egg products include separated whites and yolks, whole eggs, blends of whole eggs and yolks, and whole eggs with added ingredients. They are produced from pasteurized liquid egg products. Egg whites are very sensitive to heat and coagulate easily. For this reason, eggs are pasteurized at a temperature between 60-62°C for 3.5-4 mins. Egg whites may also be pasteurized at a lower temperature when combined with hydrogen peroxide. The hydrogen peroxide is then broken down into water and oxygen by the addition of the enzyme catalase.

There are a variety of frozen egg products like frozen whole

eggs, frozen egg white, frozen egg yolk, frozen whole egg with corn syrup, Frozen salted whole egg, etc. While freezing eggs, gelation occurs in the yolk. The viscosity of the egg increases when it is frozen because of gelation. Gelation of egg yolk is prevented by the addition of 10% sugar or salt. The shelf life of a frozen egg as per the manufacturer is about 1 year when stored at the appropriate temperature.

- **Liquid egg:** Liquid eggs are the derivatives of chicken eggs, usually used for the production of foods such as cakes, doughnuts, pasta, and mayonnaise. For making liquid eggs, the eggs are first cracked and deshelled, after which the liquid egg obtained is filtered. The liquid egg is then pasteurized. After pasteurization, the liquid is then quickly cooled down to prevent protein denaturation. Liquid egg products are processed using pasteurization and aseptic packaging techniques to extend their shelf life. Liquid eggs need to be stored at a chilled temperature to prevent any loss in quality and to prevent spoilage. The shelf life of liquid eggs as per the manufacturer is about 40-45 days under refrigerated conditions and 21 days under unrefrigerated conditions.

The various egg products made from fresh eggs make their use



very convenient. First of all the eggs are highly perishable while many products have long shelf lives. Secondly most products are made safe by processing. Even their use is so easy so it does not require culinary expertise to prepare many products. Therefore their market is rapidly rising and many different products are appearing on the market shelf.

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NUTRITION AWARENESS ACTIVITY SEMINAR ON BENEFITS OF COLOURS, FLAVOURS & OTHER INGREDIENTS FOR PREPARING HEALTHY FOOD PRODUCTS

Sponsored by IFF, Keva Flavours, Ingredion & Sensient India



AUTHOR

Ms Anuja Padte,
Food Scientist, PFNDI

PFNDI organized a Nutrition Awareness Activity in December 2022 in collaboration with Internal Quality Assurance Cell of BCAS & Department of Food Technology, Bhasakaracharya College of Applied Sciences.

The webinar was enthusiastically attended by approximately 220 participants from Delhi University colleges - Lady Irwin, Institute of Home Economics, Rajguru College of Applied Sciences and BCAS.

Besides, students and faculty members from other Universities in Delhi NCR region like Amity, NIFTEM, Manav Rachna and Sharda University also enthusiastically participated.

The theme of the Activity was "Benefits of Colours, Flavours & Other Ingredients for Preparing Healthy Food Products". The Sponsors of the event were IFF, Keva Flavours, Ingredion & Sensient India.

The recipe competition was organised on 1st December at Bhasakaracharya College of Applied Sciences & the theme for the competition was

Colours, Flavours & Colourful/Flavourful Ingredients to Make a Healthy Recipe.

The recipe competition was judged by Ms Shilpa Wadhwa, Head - Nutrition, Health & Wellness, Nestlé India & Mr Ajay Krishnamurthy, Research Scientist - Foods R&D, Dabur India Limited.



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Winners of the Recipe Competition



Ms Vidhi Sharma



MAKHANI KABAB
WITH VEGETABLE
SALAD AND LACCHA
PARATHA



KESAR PHIRNI

Ms Vidhi Sharma (Aditi Mahavidyalaya) secured 1st Prize -Makhani Kabab with Vegetable Salad, Laccha Paratha &Kesar Phirni.

Ms Misha (Aditi Mahavidyalaya) secured 2nd Prize - Chilly Garlic Potato Bites & Paneer Tikka



Ms Misha



Ms Shweta Khatri (Bhasakaracharya College of Applied Sciences) secured 3rd Prize - TriChilla

Ms Chhavi Porwal (Bhasakaracharya College of Applied Sciences) secured Consolation Prize- Rose Sweets



Ms Shweta Khatri



The Webinar on 2nd December 2022 started with the Welcome Address by Dr J S Pai, Executive Director, PFNDAI where he welcomed all the speakers and delegates. Ms. Dolly Soni, Manager of Marketing & Projects, Seminar Convenor, PFNDAI then introduced all the speakers.



Dr Jagadish
Pai



Ms Dolly Soni



Ms Chhavi Porwal



The first talk was by Mr Sachin S Rathod Flavourist Keval Flavours on "Importance of Flavour Systems to Help Reduce Salt, Sugar & Fat from Food Products". In his presentation he covered the below aspects i.e., Food for human beings, Market trends, Drivers for



Mr Sachin S Rathod

reduction, Ideal reduction strategies, Reduction approaches & Key challenges. He mentioned that after pandemic people are more conscious about their health and nutrition & 31% consumers are already purchasing health & nutrition products & 48% are planning to purchase health & nutrition products. People have now become more aware and have started reading the product labels before buying them. He further spoke about the acceptable Daily Intake Limits for all the commercial aspects such as High Fat, Salt & Sugar (HFSS) and spoke about some Ideal reduction strategies. He elaborated more on the Salt, Sugar and Fat Reduction Approaches. He ended his presentation by explaining about the Challenges faced in terms of Product Sensory, Cost reduction, Regulatory & Nutrition.

The 2nd talk was by Dr Hormaz Patva Technical Director Sensient India on "Natural Colours for Healthier Products". He mentioned why colouring is an important factor and



Dr Hormaz Patva

the aspects for having natural colours are for its Aesthetic Value, Product Identification, Judgment of Quality & Flavour Identification. He explained the Process Flow of Colour creation & how it works till the product reaches the shelf. He elaborated on the Key Challenges in Natural Colour i.e., pH Stability, Light Stability, Heat and High-Water Activity Stability. Dr Patva gave a brief idea of Key Cost Driver for Naturals colour. He further spoke on Health Benefits of Colour & discussed about the benefits of Turmeric/ Curcumin, Beta Carotene, Natural Carotenes, Lutein, Lycopene etc. He briefed the audience on Plant Based Meat Product & Effect of Natural colour solutions in vegan meat, Plant Based Dairy Product & Cheese & Egg Analogues.

The next talk was by Mr Vipul Kumar Mehra, Regional Product Manager- IFF on "Application of Flavours to Improve Undesirable Sensory Properties of Plant Based Healthy Ingredients". He



discussed on the Increased demand for plant-based protein products where he mentioned that according to Health wise 40% of global consumers said that are moderating their meat or avoiding it altogether & Ethics wise 70% of consumers are globally willing to pay >5% extra for a product that is animal welfare friendly. He elaborated on the Challenges Associated with Plant Based Protein in way of maintaining the Texture, Authenticity, Off Notes & Lingering Aftertaste. He also briefed on the

Technology to protect & deliver real, rich & authentic taste & also have protein & flavour interact between taste & plant-based proteins.



Mr Vipul Kumar Mehra





The last talk was by

**Mr Ayan
Bhattacharya**

Business Development Manager (India),
Ingredion & **Mr Brijesh Desai**,
Business Technical Service Manager,
Ingredion on Enhancing Texture and Nutrition of Plant Based Meat & Dairy Substitute. Mr Ayan spoke on the Plant Based Scenario & Consumer perception of Texture and nutrition in plant-based products. He explained the market survey done in global market for the Plant based product consumption. He gave examples of meat alternatives and what products were developed according to the target consumer such as Vegan / Vegetarian formulated meat product was to target the meat seeking consumer, Tofu was used to target consumer who are vegetarians/vegans, health seeking. He also mentioned that according to



Mr Ayan Bhattacharya



Mr Brijesh Desai

the survey current plant-based products are not meeting consumer's expectations as 32% of consumer thinks that plant-based products have poor taste and texture & 33% of consumers think plant-based products are poor in nutritional value / ingredient quality.

Mr Brijesh Desai spoke on the Meat, Sea Food & Dairy Alternatives. He spoke on 3 important aspects in the meat alternatives/ substitutes that are appearance, texture and taste. He mentioned that the functional ingredients are used as extenders to build back the nutritional and sensorial

properties. He further explained about the challenges faced in mimicking meat products with plant-based ingredients & elaborated on the consumer demands and the manufacturing challenges. He spoke on the ingredient solutions to solve the challenges faced while developing the products. He also gave information on the challenges faced while replacing dairy ingredients while making Non-Dairy cheese. In the end of his presentation, he spoke on the key properties and ingredients in Dairy and Non-Dairy Cheese.

There was a Question and Round taken after each presentation. The program ended by announcement of Winners for the competition & with a vote of thanks by **Dr Eram Rao**,

Professor-
Dept. of Food Technology
Bhasakaracharya College of Applied Sciences,
University of Delhi.



Dr Eram Rao

Please click the attached link to view the recording of Webinar Presentations -

<https://fb.watch/hzWk3kVC-L/>



REPORT ON WEBINAR ON MICRONUTRIENT FORTIFICATION

SPONSORED BY HEXAGON NUTRITION

AUTHOR

Ms Nithyakalyani V.
Food Technologist,
PFNDAI



A short video of Hexagon Nutrition was shown before presentations.

Protein foods and Nutrition Development Association of India organized a webinar on Micronutrient Fortification in collaboration with Hexagon Nutrition Ltd on 25 January 2023.

reproductive age, young children and adolescents. According to him, the awareness about food fortification needs to be increased as a simple yet sustainable strategy to overcome the challenges of micronutrient deficiency worldwide.

Dr. J.S. Pai, Executive Director PFNDAI welcomed the gathering and Ms. Dolly Soni, Manager marketing and Projects, and Seminar Convener introduced all the speakers.



Dr Jagadish Pai



Ms Dolly Soni

The first speaker Dr. A. Laxmaiah, a former Head of Community Studies NIN(ICMR), Hyderabad made a presentation on “Burden of Micronutrient Deficiencies”. In his introduction to the topic he stated that there is a triple burden on malnutrition due to under nutrition, micronutrient deficiency, overweight and obesity. He emphasized on the importance of micronutrients especially Iron, folic acid and Iodine which have a major role

Dr. Nikhil Kelkar, Joint Managing Director, Hexagon Nutrition Ltd gave the inaugural speech; he spoke about micronutrient deficiency also known as “Hidden hunger” having serious health consequences in vulnerable population which includes women in



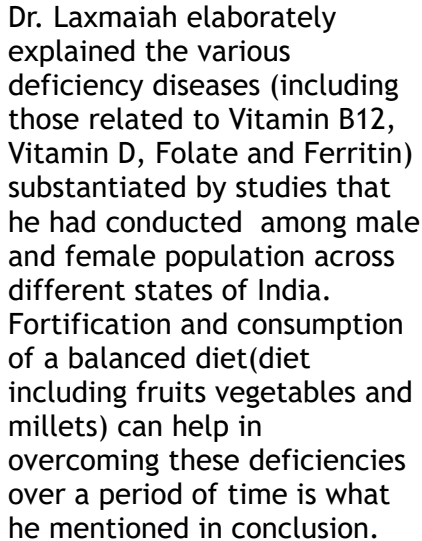
Dr Nikhil Kelkar

He further urged industry to seek right fortification partners for their project who will not only understand the science but also help in implementation up to the final stage.

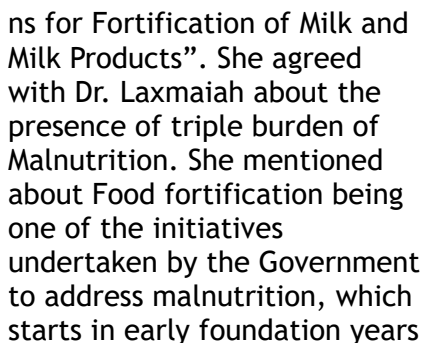


Dr A Laxmaiah

in the maternal health and for proper brain development of the fetus. Screen and Treat programs are being organised to detect anemia -a major deficiency disease.



Nutritionist,
Scientific
and
Regulatory
Affairs at
Mother Dairy
Fruit and
Vegetables
Pvt Ltd,
Delhi. Her
presentation
covered
“Technical
Consideratio



She further explained in detail about various technical considerations in

The last speaker was **Mr. Arun Om Lal**, President Corporate Affairs & Communications, Hexagon Nutrition Ltd. In his presentation on “Efforts of FSSAI on Food Staples Fortification”, he

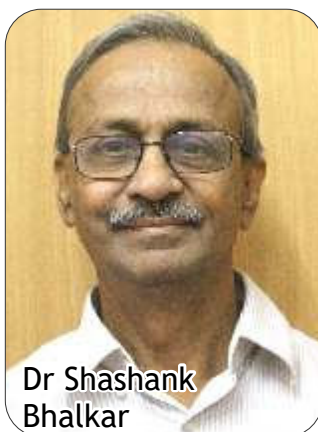
He explained the role of FSSAI in ensuring safe and wholesome food on a large scale by coming up with standards not only for staples but also for processed food like pasta, noodles and breakfast cereals, along with introduction of +F logo for identification of fortified





Panel discussion was moderated by **Dr. Shashank Bhalkar**, Assistant Director, PFNDAI.

Dr. Bhavna addressed the question on advantages and disadvantages of mass fortification where she mentioned that FSSAI is successful in identifying and mapping exact nutrients to gap the deficiency and also employing the best vehicle to carry it out with credibility throughout the country.



Dr. Himanish also addressed this question and observed that advantages far outweigh the disadvantages. He opined that for mass fortification more scientific approach needs to be taken in future like monitoring the deficiency status every five years predominantly in the under privileged section and educating consumers about fortification.

Dr. Dhruti addressed the question on whether hidden hunger is only present in low income group, she mentioned that it is prevalent across all sections of the society.

Dr. Bhavna addressed the question on implications and challenges of double fortified Salt in India, according to her challenges in double fortified

salt may be due to Iron and Iodine interaction where some change in colour and loss of iodine may occur. But trials in collaboration with FSSAI in adolescent girls show positive sensory response and some more positive result is awaited from the clinical perspective too.

Dr. Himanish addressed the question on whether there will be danger of micronutrient deficiency in younger generation as they enjoy ultra-processed food and also due to rise in food delivery platforms in India.

Dr. Himanish mentioned that Vitamins A and D are highly stable and being soluble in oil they mix and blend well in it. FBOs must look at the degradation factors

namely light sensitivity of these vitamins, so proper packaging and use of light and oxygen barrier in the packaging will prevent the loss of these vitamins. Light doesn't affect these vitamins while cooking at home but high temperatures may result in loss of these vitamins but as level of fortification in these oils is high the requirement is easily met.

Dr. Dhruti answered the question on whether Vitamins B12, folic acid and Vitamin A and D are stable in fortified food while cooking, she mentioned Vitamin A and D the fat soluble vitamins are highly stable but folic acid, Vitamin B12 are lost on cooking so adequate overages need to be added to meet the requirements.

Dr. Himanish explained how to ensure the uniform distribution when very small quantities of fortificant are added in large quantities of flour. Best way would be multiple stage mixing at the end of flour manufacturing process where premix to blend ratio should be 1: 5 to ensure uniform distribution.



REGULATORY ROUND UP



AUTHOR

Dr Shashank Bhalkar,

Asst Director, PFNDAI

assistantdirector@pfndai.org

Dear Readers

Dr. N. Ramasubramaian has been writing this column of "Regulatory Round Up" for the last more than seven years. His writing on this dry subject of Regulatory was very informative and written in very simple language so that it will be of interest to all the readers. We at PFNDAI gratefully acknowledge his contributions.

Now he has requested that I should take up this responsibility and I feel honoured for this. I am sure you will enjoy this column to the same extent, as you were earlier.

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

[Request to carry out special enforcement drive to check the quality/safety the Nutraceuticals/Health Supplements products](#) As per

the order dated 7th March 2023. All Food safety Commissioners, Central Licencing Authorities as well as Regional


Directors are directed to be extra vigilant while dealing with Nutraceuticals and Health supplement products. This is in view of many products in the market are found to be non-compliant with the regulations.

[Gazette Notification of Food Safety and Standards \(Food Products Standards and Food Additives\) Second Amendment Regulations, 2023 related to Standards for Sheep Milk, oils, Desiccated coconut, Wheat Flour or Resultant Wheat flour, Millets, Mithun \(Bos frontalis\), Dried Sweet Marjoram, Coconut Neera, Liquid nitrogen dosing in 'Natural Mineral Water' and 'Packaged Drinking Water', Substances added to Food, Microbiological Standards etc \[Uploaded on : 28-02-2023\]](#) Some of the important features are inclusion of standards for

Marjoram, Coconut Neera. In millets, the specifications of fifteen Millets are given. This is important in view of this being the international year of Millets and many FBOs are in the process of developing Millets based products. The regulation shall come into force from 1st September 2023.

[Deploying Food Safety on Wheels \(FSW\) for checking of adulteration in milk in the country](#) An order addressed to Food Safety Commissioners of all States and UTs. The order is as result of directions of Supreme court in the Swami Achutanand Tirth vs Union of India for implementing Food Safety Standards Act 2006 to check adulteration of milk. It is informed that 168 Food safety on Wheels (FSW) food testing labs will be available with the states/ UTs.





These labs can carry out testing of milk and milk products through “Milk O Screen” system installed on FSWs and can test: 1) Fat 2) SNF 3) Protein 4) Adulterants: added water, urea, sucrose, maltodextrin, and ammonium sulphate. In view of ensuing festive season of Holi, each FSW should carry out testing of at least 10 samples of milk and milk products. This testing should be monitored by respective DOs at the end of every month.

As per Article 7 of FSS (Advertisement and Claims) Regulation, 2018, if claims like “Natural”, “original”, “Traditional” are made on the label and does not comply with said provisions in the regulation, then a disclaimer “This is only a brand name or trade mark and does not represent its true nature” must be made. The position of this disclaimer on the label has been subjected to many changes. In the original notification, the position was left to the FBO. A draft notification was published in 27.12.2021 directing the disclaimer to be below the name or brand name of the food. However, the final notification published on 13.12.22 directs the disclaimer to be on the front of the panel. As there is a major deviation from the draft regulation and on request from FBOs, [FSSAI vide its order dated 27.02.23](#) has extended the compliance date of this provision (declaring the disclaimer) by 6 months to 13 June 23.

[Frequently Asked Questions \(FAQs\) on application for Vegan logo endorsement](#). These FAQs will be very useful to FBOs applying for the endorsement of Vegan logo as they explain the regulation with examples

[As per Food safety Standards \(Vegan Foods\) Regulations 2022, via Gazette notification guidelines for submission of applications for endorsement of Vegan logo and formats came in effect from 25th July 2022. Now as per the order dated 24th February 2023, these guidelines are revised.](#)

[As per order dated 24th February 23, requirement of health certificate to be accompanied with import consignments is extended till further order.](#)

[Implementation of Traceability Application under Repurpose Used Cooking Oil \(RUCO\) Initiative](#) (Notice dated 24th February 23). As per Earlier notification dated 06th May, 2019 which mandated FBOs whose consumption of edible oil for frying is more than 50 litres per day would maintain the usage record and would dispose UCO to agencies authorized by FSSAI or Commissioner of Food Safety of States/UTs agencies were from time to time. In order to streamline the RUCO initiative and to promote ease of doing business, FSSAI has developed the RUCO Traceability Application. This will be available on RUCO website and will be operational from 15th March 23.

[Revocation of Suspension of food testing laboratories-reg. In continuation of earlier order](#)

[dated 22 Dec 22, suspension of following two laboratories has been revoked](#). Viz. Centre for Environment & Food Technology Pvt. Ltd., New Delhi and Konark Research Foundation, Daman and Diu.

[FSSAI in its order dated 15th Feb 23 has given list of FSSAI recognised laboratories along with validity of their NABL accreditation scope of testing](#). This is routinely published by FSSAI. Manufacturers are expected to check the updated list before they could give samples to the concerned laboratory.

[De-recognition and de-notification of In house testing laboratories of FBOs](#). Food authorities have decided not to notify such laboratories because of various reasons such as conflict of interest, location of the laboratories in the manufacturing area of FBO etc. To initiate the process, FSSAI has de-notified two In-house laboratories.

[In the earlier direction of 27th July 2022 FSSAI kept in abeyance Alcoholic acidity of Bajra flour, Millet flour, Multigrain flour and Mixed Millet flour till 31st December 2022. Same was for Total Dietary Fiber of Millet flour. FSSAI in its order 15th February further extended the period till 30th June 2023](#). This has been done because the data submitted by stakeholders is under examination.



RESEARCH IN HEALTH & NUTRITION

Peanuts and herbs & spices may positively impact gut microbiome

Science Daily December 1, 2022

The human gut microbiome is a collection of trillions of microorganisms that live inside the intestinal tract. The bacteria there can affect nearly all systems of the body, including metabolism and the building and maintaining of the immune system.

"Research has shown that people who have a lot of different microbes have better health, and a better diet, than those who don't have much bacterial diversity," said Penny M. Kris-Etherton, Evan Pugh University Professor of Nutritional Sciences, Penn State.

For the peanut study, which published in the journal *Clinical Nutrition*, Kris-Etherton and her colleagues compared the effects of snacking on 28 grams (approx. 1 ounce) of peanuts per day, versus a higher carbohydrate snack -- crackers and cheese.

At the end of six weeks, participants who ate the peanut snack showed an increased abundance of Ruminococcaceae, a group of bacteria linked to healthy liver metabolism and immune function.

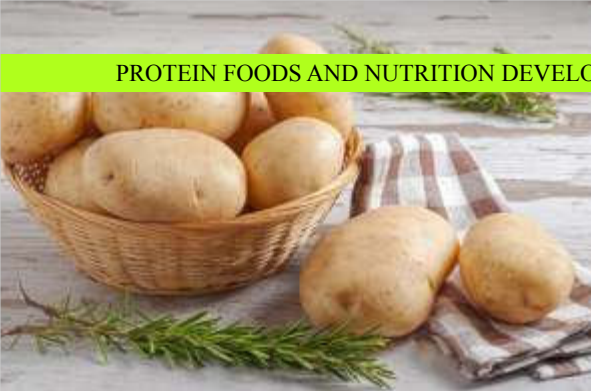


In the herbs and spices study, which published in *The Journal of Nutrition*, scientists analyzed the impact of adding blends of herbs and spices -- such as cinnamon, ginger, cumin, turmeric, rosemary, oregano, basil and thyme -- to the controlled diets of participants at risk for cardiovascular disease. The team examined three doses -- about 1/8 teaspoon per day, a little more than 3/4 teaspoon per day and about 1 1/2 teaspoon per day. At the end of four weeks, participants showed an increase in gut bacteria diversity, including an

increase in Ruminococcaceae, most notably with the medium and high doses of herbs and spices.

"It's such a simple thing that people can do," said Kris-Etherton. "The average American diet is far from ideal, so I think everyone could benefit by adding herbs and spices. It's also a way of decreasing sodium in your diet but flavouring foods in a way that makes them palatable and, in fact, delicious! Taste is really a top criterion for why people choose the foods they do."

In both studies, the increase in Ruminococcaceae and bacterial diversity was viewed positively, as scientists continue to learn more about the connection between the gut microbiota and a spectrum of health factors, from blood pressure to weight. However, Kris-Etherton is quick to point out that more research is needed to understand all of the implications. She said, "We need a lot more research on the microbiome to see what its proper place is in terms of overall health."



Why potatoes don't deserve their bad reputation

They may not have all of the benefits as other veggies, but potatoes can still be a healthy option
Science Daily December 5, 2022

With low or no-carbohydrate diets rising in popularity in recent times, the humble potato is now regularly overlooked in favour of other vegetables. In fact, research literature has previously indicated potatoes may have a detrimental effect on health, such as possibly increasing the likelihood of developing Type 2 diabetes.

However, new Edith Cowan University (ECU) research has shown while spuds may not have all the same benefits as some other vegetables -- such as lowering risk of Type 2 diabetes -- health issues associated with potatoes may actually be due to how people are preparing them and what they're eating them with.

More than 54,000 people reported their dietary intake for the long-term Danish Diet, Cancer and Health study. A recent analysis of this study led by Dr Nicola Bondonno from ECU's Nutrition and Health Innovation Research Institute, found people who consumed the most vegetables

were 21 per cent less likely to develop Type 2 diabetes than those who consumed the least amount of vegetables.

While potatoes didn't have the same impact on Type 2 diabetes, they also didn't have any negative effect. In previous studies, potatoes have been positively linked to incidence of diabetes, regardless of how they're prepared -- but current analysis found that's not true.

When boiled potatoes were separated from mashed potatoes, fries or crisps, boiled potatoes were no longer associated with a higher risk of diabetes: they had a null effect. People who ate the most potatoes also consumed more butter, red meat and soft drink -- foods known to increase risk of Type 2 diabetes. Boiled potatoes are no longer associated with diabetes. It's only fries and mashed potatoes, the latter likely because it is usually made with butter, cream and the like. Findings indicate vegetables could play a key role in reducing Type 2 diabetes, as people who ate a lot of leafy greens and cruciferous veggies such as spinach, lettuce, broccoli and cauliflower had a significantly lower risk of developing the condition.

Not all micronutrients created equal: Study identifies some supplements that benefit cardiovascular health

December 5, 2022

A new meta-analysis published



in the Journal of the American College of Cardiology provides some clarity. Researchers systematically reviewed 884 studies available to date on micronutrients taken as dietary supplements and analyzed their data. They identified several micronutrients that do reduce cardiovascular risk -- as well as others that offer no benefit or even have a negative effect. More than 883,000 patients were involved in the combined studies.

Antioxidant supplementation has long been thought to play a role in heart health. That's because these nutrients work to reduce oxidative stress, a known contributor to many cardiovascular diseases. Heart-healthy diets like the Mediterranean diet and the Dietary Approach to Stop Hypertension (DASH) feature foods that are naturally rich in antioxidants. However, results from studies of antioxidant supplements have been inconsistent -- one reason why this approach hasn't yet been widely adopted in preventative cardiology.





The researchers looked at randomized, controlled intervention trials evaluating 27 different types of antioxidant supplements. They found strong evidence that several offered cardiovascular benefit.

These included omega-3 fatty acid, which decreased mortality from cardiovascular disease; folic acid, which lowered stroke risk; and coenzyme Q10, an antioxidant sometimes marketed as CoQ10, which decreased all-cause mortality. Omega-6 fatty acid, L-arginine, L-citrulline, Vitamin D, magnesium, zinc, alpha-lipoic acid, melatonin, catechin, curcumin, flavanol, genistein and quercetin also showed evidence of reducing cardiovascular risk.

Not all supplements were beneficial. Vitamin C, Vitamin D, Vitamin E and selenium showed no effect on long-term cardiovascular disease outcomes or type-2 diabetes risk. And beta carotene supplements increased all-cause mortality.

Low-carb diet regulates short-term weight loss and glucose in diabetes patients

13 Dec 2022 Nutrition Insight

A low carbohydrate diet could help diabetes patients achieve better weight loss and glucose

control in the short term, according to a study conducted by researchers from the University of Southern Denmark. The changes, however, were not sustained three months after the intervention, suggesting a need for long-term dietary changes to maintain meaningful health benefits.

Researchers from the University of Southern Denmark randomly assigned 165 persons with Type 2 diabetes to either a low-carb high-fat (LCHF) diet or a high-carb low-fat (HCLF) diet for six months. The mean age was 56 and 58% of the participants were women.



Participants in both groups were asked to consume the same number of calories equal to their energy output. For example, participants on the low-carb diet ate no more than 20% of their calories from carbohydrates but could have 50-60% of their calories from fat and 20-30% from protein. Patients on the low-fat diet were asked to eat about half of their calories in carbohydrates, and the rest



evenly split between fats and proteins.

The study, published in Annals of Internal Medicine, found that an LCHF unrestricted diet helped patients achieve better weight loss and glucose control than an HCLF diet.

Glycemic control, serum lipid levels, metabolic markers and liver biopsies were measured to assess NAFLD. The authors found that participants on the low-carb diet reduced hemoglobin A1c by 0.59% more than the low-fat diet and lost 3.8 kg more weight than those in the low-fat group.

The low-carb dieters also lost more body fat and reduced their waist circumference. Both groups had higher high-density lipoprotein cholesterol and lower triglycerides after six months. The changes were not sustained at the nine-month follow-up. The liver was not affected by the high-fat intake in the low-carb group. The researchers found no difference in the amount of liver fat or inflammation between the two groups.

By Inga de Jong



Vitamin D may reduce inflammation during resistance training

14 Dec 2022 Nutrition Insight

Data on the effect of vitamin D supplementation on cardio-respiratory fitness (VO2 max) are conflicting. Researchers have found it has a negligible impact on cardio-respiratory fitness performance, while discovering that it may still help regulate inflammation in vitamin D-deficient young men conducting resistance training.

The main objectives of the present study were to assess the impact of Vit-D supplementation on VO2 max and inflammatory status in vitamin D deficient young, healthy men. The overall findings of the paper were published in the journal Nutrients.



Vitamin D is a fat-soluble vitamin, the bioactive form of which - calcitriol - acts in the human body like a steroid hormone via specific nuclear receptors. Calcitriol inhibits and stimulates the production of pro- and anti-inflammatory cytokines, respectively.

Furthermore, previous research has uncovered that vitamin D may promote erythropoiesis and hemoglobin synthesis, while affecting the binding affinity of oxygen to hemoglobin.



“It is therefore not surprising that previous studies reported an independent robust association between serum vitamin D levels and VO2 max in adults over a wide age range,” state the researchers.

The researchers note it is well established that VO2 max is inversely associated with cardiovascular disease risk and all-cause mortality.

Chronic low-grade inflammation, on the other hand, plays a critical role in the pathogenesis of atherosclerosis, the latter being the main cause of cardiovascular diseases.

Participants were assigned to one of the two groups, which, in a double-blind manner, supplemented their diet daily with either vitamin D (8,000 IU) or a placebo. They were asked to perform simultaneously a 12-week supervised resistance-

training program. During the 12-week intervention, serum vitamin D concentrations increased 3.9-fold in the group given vitamin D, while no changes occurred in the placebo group.

In conclusion, the 12-week vitamin D supplementation was found to improve the inflammatory status, while having no impact on VO2 max in vitamin D-deficient young men engaged in resistance training.

“One of the strengths of the present study is the inclusion of only vitamin D-deficient men,” state the researchers. “This excludes the possible influence of substantial individual differences in baseline vitamin D status on the results.”

By Benjamin Ferrer





Nutrition's role in battling depression during the darkest time of the year

15 Dec 2022 Nutrition Insight

A study published in *Cureus* explores the relationship between diet and depression. The researchers found that following a healthy diet high in fruits and vegetables and avoiding inflammatory foods high in salt and sugar may decrease the risk of developing depressive symptoms or clinical depression. Avoiding junk food, fast food and high meat intake also showed a reduced risk.

The researchers highlight that diets' role in depression may go beyond what is consumed and argue that dietary patterns, eating habits, the time between meals and what type of cuisine one follows may all play a role, although further research is needed.

The new study points out that depression threatens the economy in both industrialized and developing nations. The World Health Organization said earlier this year that one year of lost productivity costs the global economy US\$1 trillion annually, and equals 12 billion lost working days.

The researchers used a systematic review method

including nine studies, five observational and four systematic reviews. The data was collected from various countries to find a correlation between diets and depression on a larger scale.

The results showed that diets impact mental health, particularly evidenced in a study where eating green and yellow vegetables and fresh fruits showed a positive association with mental well-being in adolescents.

Another example is the impact of alcohol consumption as a driver of anxiety and depression. Physical inactivity and high meat consumption were also associated with developing depressive symptoms.

The study also points to anti-inflammatory diets being beneficial for mental health, particularly following a Mediterranean diet. Lastly, malnutrition among the elderly showed a link with decreased mental well-being. Eight out of nine studies showed a link between healthy diets and mental well-being.

By Beatrice Wihlander

Pomegranate extract strengthens gut microbiome and skin health connection

05 Dec 2022
Nutrition Insight

US-based researchers have found that



pomegranate extract (PE) can improve biophysical properties of the skin, including the reduction of facial sebum production and trans-epidermal water loss (TEWL).

Additionally, smoothening of wrinkles and shifts in skin microbiome were observed with oral supplementation of the extract. They conducted a double-blind, placebo-controlled clinical trial using Verdure Science's patented pomegranate extract dubbed Pomella.

The results of the four-week study showed a "statistically significant" decrease in the facial wrinkle severity and a decreasing trend in the sebum excretion rate on the forehead. Furthermore, subjects who received the supplement displayed a higher level of Eggerthellaceae bacteria in their gut microbiome analysis, showing a statistically significant reduction in TEWL, compared to those that did not express Eggerthellaceae, suggesting that the extract improved the skin barrier function.



“The mechanism of action for the decrease in wrinkles is not clear, but PE is rich in antioxidants and may be protective against collagen breakdown,” the study published in the Journal of Clinical Medicine highlights.

The researchers have credited the effects of the potent antioxidant and anti-inflammatory properties of the phytochemicals present in the Pomella supplement. Still, they warn that future studies with an expanded population are needed.

Edited by Radhika Sikaria



High-protein diets may keep weight loss results consistent

06 Dec 2022 Nutrition Insight

A new study led by researchers from the Shanghai Institute of Nutrition and Health of the Chinese Academy of Sciences purports that a high-protein diet and specific antibiotics can prevent weight gain after dieting when most individuals gain the weight back.

The recommendation comes on the back of findings that show that an increase of Lactobacillus and its metabolites after dieting enhanced intestinal lipid absorption leading to quick fat accumulation. A high-protein diet inhibits the growth of

intestinal Lactobacillus.

The experiments conducted on mice demonstrate why fat is gained after dieting. The results showed that the high-protein diet prevented quick fat mass accumulation and obesity and even partially maintained the fat loss induced by dieting.

The study, “High-protein diet prevents fat mass increase after dieting by counteracting Lactobacillus-enhanced lipid absorption,” published in Nature Metabolism, demonstrates that refeeding after dietary restriction (DR) contributes to the development of obesity.

Further tests revealed that a high-protein diet after dieting reduced the levels of bile acids in the intestine and in serum, reduced intestinal lipid absorption, decreased lipid anabolism in WAT and increased total lipid oxidation.

They found that refeeding with a normal-protein diet after dieting dramatically increased the abundance of Lactobacillus by about 50%. This increase was markedly suppressed when refed with a high-protein diet.

By Inga de Jong

Eating a serving of dark, leafy greens daily may slow memory decline

Nov. 22, 2022 Judy Packer-Tursman (UPI)



People who eat and drink more foods with flavonols -- found in certain fruits and vegetables, including kale, tomatoes, apples and oranges, plus tea and wine -- may have slower memory decline in older age, a study published Tuesday suggests. The findings appeared in Neurology, the journal of the American Academy of Neurology.

Taking such simple steps as eating more fruits and vegetables and drinking more tea is an easy way for people to take an active role in maintaining their brain health. Those who consumed the highest level of flavonols, an average of seven servings of dark leafy greens a week or one serving of dark, leafy greens a day, versus the lowest level, had a 32% decrease in their rate of cognitive decline.





Changes in the brain, such as the accumulation of amyloid plaques and hyper-phosphorylated tau protein or neurofibrillary tangles in the case of Alzheimer's disease, begin perhaps 10 years to 20 years before the onset of easily detectable clinical signs of it. Healthy behaviours, especially when it comes to food and drink, are always timely. It is never too early, or too late to start making healthy lifestyle changes, especially when it comes to diet. A diet diverse in fruits and vegetables is critical for both cognitive and physical functioning."

Flavonols are a specific subclass of flavonoids, which are molecules found in many fruits and vegetables, along with tea and wine, that have antioxidant and anti-inflammatory properties and are known to prevent or diminish cellular damage throughout the body, including the brain. Flavonols are primarily found in kale, beans, tea, spinach, broccoli, tomatoes, apples, wine, oranges, pears and olive oil. The highest level of flavonols generally is contained in the leaf or skin of the vegetable or fruit, and in lower concentrations in the extract or juice.

The study involved 961 participants, averaging 81 years old, who did not have dementia. They were followed for an average of seven years.

Dietary intake of kaempferol and quercetin was associated with slower global cognitive decline, but myricetin and isorhamnetin were not, the researchers found.

Plant-based drinks 'not real alternatives' to dairy milk - study

By Teodora Lyubomirova 14-Nov-2022 - Food Navigator Asia

Nutrient quality in plant-based beverages should be considered on a par with sustainability credentials, researchers say as they assessed the quality as well as quantity of micronutrients in common plant-based drinks.

The study, carried out by Swiss scholars and nutrition experts, analyzed the nutrient profile of 27 samples of plant-based beverages and two of cow's milk were compared. The plant drinks, 13 of which were fortified, were collected from two major supermarkets in Bern and included soy, almond, cashew, coconut, hemp, oat, rice and spelt.

To compare nutrient and energy intakes, the researchers used the dietary reference values for Germany, Austria and Switzerland and also estimated the quality of proteins through calculating the digestible indispensable amino acid score (DIAAS). Nutrients such as vitamins C, A, E, D2, K1 and K2 were analyzed as well as phosphorus, sodium, manganese,

magnesium, potassium, iron, copper, calcium, zinc, iodine, biotin, niacin, pantothenic acid, and others.

Unlike similar research conducted in the past, which relied on labelling information to determine nutrient content levels, and only evaluated a handful of nutrients, the Swiss study investigated each product sample in a laboratory to determine its nutrient composition and quality.

According to the laboratory analysis, vitamin C, A and K2 could not be detected in the measured plant-based drinks, with B2, B12 and D2 almost absent in non-fortified varieties. The researchers noted that the absence of some vitamins, such as the heat-sensitive C, B1 and A, could be down to food processing conditions. Meanwhile, plant-based alternatives offered high vitamin E content, particularly almond and soy, whilst K1 concentrations were 'significant' in cashew and soy drinks. On minerals, soy drinks were richest in copper, magnesium, manganese, potassium, zinc and iron, and also came closest to dairy milk in terms of protein content.



The second-highest mean protein contents were found in cashew and almond drinks, while protein levels were 'very low' in oat, coconut and rice-based beverages.

In terms of protein quality, milk came ahead of all plant-based samples with a higher DIAAS. The researchers also noted that phytic acid, which is naturally contained in plant-based milk and is a key source of phosphorous, is a 'known anti-nutrient able to chelate i.e. to bond micronutrients such as calcium, zinc, magnesium and iron.'

The study also highlighted the use of red algae in some plant-based alternatives, which, while useful for boosting iodine levels, 'should also be monitored because of possible arsenic accumulations,' the study reads.

On sugar, the research noted that sucrose - a simple sugar, which had been linked with increased risk of obesity, cardiovascular disease and type-2 diabetes - was 'the main sugar in the plant-based drinks with a glycaemic index of 61'. In a previous study, plant-based alternatives had been found to have a higher GI of 47.52 to 99.96 compared to dairy milk's 46.93.

"Despite the generally lower total carbohydrate content in plant-based drinks (except some rice and oat drinks), milk consumption appears therefore more favourable in terms of GI," the Swiss study claims.

The researchers concluded that plant-based drinks were

'limited' in providing a 'significant' amount of micronutrients, unlike cow's milk. "In future, nutritional quality of plant-based drinks with science-proven nutrient and micronutrient bioavailability should be equally considered and communicated than sustainability goals," the authors wrote. "Practical solutions to mitigate nutritional gaps of specific plant-based drinks could be to opt, whenever possible, for a combination of plant-based alternatives as part of a balanced diet to ensure adequate fulfilment of nutrient and micronutrient needs.

"Finally, real innovation opportunities exist on evolving conventional and ultra-processing food manufacturing techniques, generally required in the manufacturing of plant-based products, toward simplified and/or natural processes such as microbial fermentation that can reduce anti-nutritional characteristics of foods/ingredients, improve protein digestibility and produce additional micro-or phytonutrients."

'Blend of three probiotics shown to reduce stress-induced diarrhoea

By Tingmin Koe 07-Nov-2022 - Food Navigator Asia

A blend of three probiotic strains



has been shown to reduce stress-induced abdominal symptoms, such as diarrhoea, following four weeks of supplementation.

This is according to a RCT conducted by researchers from Japan-based Kaneka Corporation between October 2020 and March last year. Findings were published in Heliyon.

A total of 60 adults who routinely felt stress and suffered from diarrhoea with abdominal pain and/or discomfort, but who were judged not to have inflammatory bowel disease (IBD) and irritable bowel syndrome (IBS) were recruited into the trial. They were randomised into two groups, where they either took a capsule of the probiotics or placebo everyday for four weeks.

The probiotic blend consists of *Pedococcus acidilactici* KABP-021 (CECT7483), *Lactiplantibacillus plantarum* KABP-022 (CECT7484), and *L. plantarum* KABP-023 (CECT7485) at a concentration of 10bn CFU per strain. This specific blend has been reported to improve IBS related quality of life.





To measure any changes from the intervention, the participants were required to answer a questionnaire that looks at abdominal symptom-related quality of life. The researchers also measured the plasma concentrations of pro-inflammatory cytokines to detect any changes stemming from the intervention.

Probiotic intervention has been shown to significantly reduce stress-induced abdominal symptoms, in particular diarrhoea. This was seen from the participants' questionnaire response evaluated by Izumo scale scores. For instance, to the question on "Are you bothered by stress-related diarrhoea?", the score for the intervention group had significantly dropped from three points at baseline to one point after four weeks.

In contrast, the change in the placebo group was from 3.5 points at baseline to two after four weeks. While there a

significant difference between the intervention and placebo group based on the survey findings, the difference between the two groups was not supported by objective evaluations - such as plasma concentrations of pro-inflammatory cytokines and the Bristol Stool Form Scale.

In addition, there were no significant differences in the two groups in terms of stool frequency, stool form, abdominal pain and discomfort.

"Possible reasons for the differences in these evaluations were that the changes in symptoms in these healthy individuals may be expected to be smaller compared with those in patients with IBS," the researchers explained. "Further investigations using more participants, different intervention strategies, and different dosing regimens (e.g., frequency of intake per day and/or daily amount of intake) may provide more insights into the most effective, safest, and most sustainable methods for supporting IBS-like people," they said.

There was a significant correlation between the improvement in diarrhoea scores and the number of the

good bacteria *Faecalibacterium* in the gut of the intervention group.

Faecalibacterium is a bacterium that produces the short-chain fatty acid butyric acid, and the researchers hypothesised that this could have led to better mental health scores in the intervention group.

"We propose that the probiotic intervention directly reduced intestinal permeability and/or supported beneficial bacteria, such as *Faecalibacterium*, in the host microbiota, ultimately leading to stabilization of mental activity, possibly via the vagal autonomic nerve. This hypothesis is partially supported by previous studies suggesting a correlation between improvement of the gut microbiome and the mental activity of patients with IBS as well as healthy individuals. However, future studies should aim to confirm whether this probiotic activity has direct effects on the intestinal mucosa and/or on the gut microbiome," they said.





FOOD SCIENCE & INDUSTRY NEWS



Micro-particles could help prevent vitamin A deficiency

Science Daily December 12, 2022

Massachusetts Institute of Technology researchers have developed a new way to fortify foods with vitamin A, which they hope could help to improve the health of millions of people around the world.

In a new study, they showed that encapsulating vitamin A in a protective polymer prevents the nutrient from being broken down during cooking or storage.

In a small clinical trial, the researchers showed that when people ate bread fortified with encapsulated vitamin A, the bioavailability of the nutrient was similar to when they consumed vitamin A on its own.

Vitamin A is critical for not only vision but also the functioning of the immune system and organs such as the heart and lungs.

Efforts to add vitamin A to bread or other foods such as

bouillon cubes, which are commonly consumed in West African countries, have been largely unsuccessful because the vitamin breaks down during storage or cooking.

In a 2019 study, the MIT team showed that they could use a polymer called BMC to encapsulate nutrients, including iron, vitamin A, and several others.

They showed that this protective coating improved the shelf life of the nutrients, and that people who consumed bread fortified with encapsulated iron were able to absorb the iron.


BMC is classified by the FDA as "generally regarded as safe," and is already used in coatings for drugs and dietary supplements. In the new study, the researchers focused on using this polymer to encapsulate vitamin A, a nutrient that is very sensitive to temperature and ultraviolet light.

Using an industrial process known as a spinning disc

process, the researchers mixed vitamin A with the polymer to form particles 100 to 200 microns in diameter. They also coated the particles with starch, which prevents them from sticking to each other.

The researchers found that vitamin A encapsulated in the polymer particles were more resistant to degradation by intense light, high temperatures, or boiling water.

Under those conditions, much more vitamin A remained active than when the vitamin A was free or when it was delivered in a form called VitA 250, which is currently the most stable form of vitamin A used for food fortification.



The researchers also showed that the encapsulated particles could be easily incorporated into flour or bouillon cubes. To test how well they would survive long-term storage, the researchers exposed the cubes to harsh conditions, as recommended by the World Health Organization: 40° C and 75% humidity. Under those conditions, the encapsulated vitamin A was much more stable than other forms of vitamin A.

When the researchers cooked their encapsulated particles and then fed them to animals, they found that 30 percent of the vitamin A was absorbed, the same as free uncooked vitamin A, compared to about 3 percent of free vitamin A that had been cooked.

Collagen calling: Minding the gap in beauty-from-within and mobility trends

20 Dec 2022 Nutrition Insight

Advances in formats, applications, sourcing and sustainable practices in the collagen space took centre stage at the FiE and HiE 2022 trade show and are driving innovations as the mobility and beauty-from-within trends

continue.

“Collagen itself is one of the hottest trends in the food and supplement market,” explains Oliver Wolf, head of global B2B marketing at Gelita. “The application areas and the vast effects of collagen for our body are only partly discovered so far.”

Douglas Jones, global sales and marketing manager at BioCell Technology, explains that BioCell collagen is unique as it is a true bioactive with “source material being chicken sternal cartilage -final material is actually a matrix of hydrolyzed collagen type two peptides, hyaluronic acid and chondroitin sulfate.”



The companies agree that one of the most significant factors driving collagen innovation is the appeal to both the younger and aging demographics, even in the area of mobility.

“Everybody knows that moving the body, being physically active, is essential for health,” says science communicator and lifestyle physician Dr. J. W. Langer. “What they don’t know is that you also have to provide the building blocks for the skeleton, for the joints, for the tendons and for the muscles. It’s very good to conduct light- or

high-intensity exercise, but you also have to take care of your diet.”

“So what do people do?” Langer asks rhetorically. “They eat more plant-based, they cut down on meat, they eat a lot of vegetables, they add on some fish, and that’s very good, but they forget that our main source of collagen - the protein that builds up our body bit of our tendons and joints and bones - is only found in the animal food.”

Dr. Langer explains that fish skin gives about 3 g of collagen. However, he states that he recommends people take about 8 to 10 g of collagen as a supplement. According to Langer, this reveals the need for extra supplementation even if a person is “eating smart.”

Additionally, Wolf notes that there are other solutions brewing to this problem and that non-animal-based ingredients are gaining interest. Gelita realized this trend early and set up the Gelita Biotech Hub in Germany to research how collagen can be produced by biotechnology and no longer requires animal-based resources.



Products such as Fortigel, Fortibone and Tendoforte promote joint cartilage recovery for better mobility, improves bone density and keeps ligaments and tendons elastic resulting in lower injury risks for athletes. Collagen is also a very good ingredient if you want to formulate high-protein bars because it works very nicely together with whey protein and with how much protein you can actually pack in the bar.

By William Bradford Nichols



US patent for infant nutrition targeting neuro-developmental benefits

21 Dec 2022 Nutrition Insight

US-based Cerebelly receives the “first ever” patented food composition consisting of 16 key nutrients aimed at optimizing infant neurodevelopment. The science-based formulation treats different parts of the brain for early development.

“Cerebelly is the first and only patented science-backed baby food that delivers whole food nutrition designed for optimal cognitive development,” Dr. Teresa Purzner, founder of Cerebelly and a practicing

neurosurgeon in developmental neurobiology, tells NutritionInsight.

The product comes in pouches - each containing 16 nutrients in organic vegetable formulas without added sugar. Each pouch has vitamin D, iron, vitamin A, vitamin B6, vitamin B12, zinc, copper, niacin, folate, iodine, selenium, choline, protein, docosahexaenoic acid (DHA), vitamin E and lutein.

The company stresses that the brain grows and peaks at different times, each having its nutrient needs to support seeing, hearing, memory, cause and effect, attention, social awareness and more. The products also undergo “rigorous testing for heavy metals and harmful toxins.”

Cerebelly focuses on nutrition that supports early brain development and growth, stressing that the brain cells children have at the age of three are mostly the same cells they will have throughout life. Over time, those formed brain cells continue to make new connections but do not generate new cells.

The pouches contain eight times the nutritional value compared to “the seven top sellers on the market.” They are also vegetable-first derived and plant-based, making them free from lactose and gluten.

By Beatrice Wihlander



Small fish, big benefits: Experts spotlight pelagic species as affordable solution to global malnutrition

05 Dec 2022 Nutrition Insight

As world organizations search for solutions to nutrient deficiencies in developing countries, researchers from several countries across the globe are touting the health and cost-effectiveness of small fish species in a new study. The multinational team revealed that small fish could help close malnutrition gaps for undernourished people, especially young people and small children.

The study, published in Nature food, used economic, nutrient and catch data from 2,348 species to identify the most nutritious fish in 39 low- and middle-income countries. Researchers found that pelagic fish like anchovies, sardines and herring were the most inexpensive fish in 72% of countries.





Moreover, one 100 g serving of the fish represented between 10% to 30% of the average daily diet budget across these countries. Anchovies, sardines and herring - commonly known as pelagic fish - inhabit the upper layers of the open sea and lakes and are some of the easiest to catch in large quantities.

Additionally, pelagic fish are rich in omega 3 fatty acids, zinc, selenium, calcium and iron and are up to half the cost of other fish groups. The researchers, who hail from Canada, the US, the UK, Malaysia, Ghana, Italy and Kenya, also found that cold water fish like cod and flounder were the least affordable.

These findings could be especially important for places like sub-Saharan Africa, where nutrient deficiencies are on the rise, and children from six months to four years old reportedly only intake about 38% of the recommended amounts for seafood.

Furthermore, the fish are caught in such large amounts that less than 20% of current catch amounts would meet all of the nutritional requirements for children under five who live near coastlines or large bodies of water.

Edited by William Bradford Nichols

Cell-Based Milk Could Change the Dairy Industry

NEW YORK, Nov. 8, 2022
/PRNewswire

The dairy industry is among the most environmentally unsustainable sectors due to its contribution to greenhouse emissions, notably the releases of methane and degradation of biodiversity and water resources.



However, the latest biotechnological advances are looking to improve the sector's green credentials with the introduction of cell-based milk.

Turtle Tree Labs is one start-up creating cell-based milk, which promises milk products from cells grown in the lab. The start-up produces milk from mammary cells grown in the lab and produces milk in bioreactors.

Cell-based milk is a niche sector that could eat into the \$871 billion global dairy sector. Meanwhile, the global plant based milk market is continuing to gain steam, hitting nearly \$39 billion in

2022. The market is projected to rise at a CAGR of 15.5% to reach \$123.2 billion by 2029, creating an opportunity for many companies.

Perfecting Sweet Potato Chips

FOOD TECHNOLOGY
MAGAZINE, NOVEMBER 1, 2022,
Danielle Beurteaux

Treating sweet potato slices with a particular blend of enzymes may help chip makers create better sweet potato chips, research from the U.S. Department of Agriculture's (USDA) Agricultural Research Service (ARS) suggests. They hypothesized that the cell wall polymers also play a role in texture and fat content and wanted to explore what happens when the cell wall polymers are changed.

The researchers used Covington sweet potatoes, a variety often chosen for sweet potato snacks. Sliced potatoes were treated with a range of food grade enzymes—cellulase, hemicellulase, pectinase, pectin methyl esterase, protease, and a blend—before they were fried.



Each of the enzymes had a specific function; one broke down pectin, one strengthened it, one broke down proteins, another broke down hemicellulose, and a different one broke down cellulose.

As a control, no enzyme was used. The potato slices were exposed to the enzymes for ½ hr, 1 hr, and 2 hr. Then the fat content, sugars, colour, and other chip properties were analyzed.

The research team found that the enzyme blend that broke multiple cell wall polymers lowered fat content the most. Also, the protease reduced the chip's breaking force.

Generally, the enzyme blend and the protease both reduced the breaking force, and pectin methyl esterase, which strengthens the pectin, produced harder chips. That confirmed our hypothesis that the cell wall polymers do affect chip textures, and possibly their fat content, too.

The market for sweet potato snacks is no longer niche, because of sweet potatoes' nutritional profile. Consumers want more sweet potato products because of beta-carotene and health benefits.

ChickP Raises Dairy-Free Ice Cream to New Heights

REHOVOT, Israel, Nov. 29, 2022 /PRNewswire

ChickP Protein, a food-tech start-up, introduces chickpea protein isolate for plant-based ice cream. Protein from this



ancient crop zeroes in on the non-dairy category to make a tasty plant-based frozen dessert with a creamy mouthfeel just like dairy ice cream.

Everyone loves ice cream. Ice cream is a joyful treat that evokes indulgence, and comfort. But many consumers are not able to enjoy eating ice cream due to lactose sensitivity or intolerance, or dairy allergies.

Moreover, many consumers are trending away from animal-derived products. In addition, sustainability and ecology

concerns are driving many consumer purchases. There are plant-based ice creams on the market, but they lack the true, creamy texture of dairy ice cream.

They were able to imitate the exact rich, uniquely creamy taste and texture of mascarpone. Chickpeas are not listed as allergens and our products are non-GMO, making them an ideal choice for replacing dairy proteins.

When developing an ice cream application, protein isolate provides important functionalities, such as emulsion stability, prevention of icing and crystallization, and the creation of an ideal melting profile.

These constitute the key parameters for maintaining a frozen dessert's indulgent properties throughout its shelf life. It also provides exceptional whipping capabilities, with a neutral fresh taste suitable for merging any desired flavour.





powder using a low-energy mixer and with no stabilizers added. The bottle was divided into three segments, which were analyzed separately to

Capsoil Food Tech creates water-soluble vitamin D powder for carrageenan-free milk products

08 Nov 2022 Food Ingredients First

Using its patented nanotechnology, Capsoil Food Tech has developed a unique, water-soluble vitamin D powder, which is touted as “unlike anything else on the market.”

The powder can be added to milk for more even distribution and longer shelf life, without the use of stabilizers such as carrageenan. The composition of powder is very different and uses a completely different technology, so it does not need stabilizers.

Most companies who add vitamin D use a diluted powder containing only 0.01% vitamin D. Stabilizers like carrageenan make up the rest of this powder, as well as other ingredients that are not included on the label due to the regulatory allowance.

They conducted a study with High-Temperature Short-Time (HTST) pasteurized 3% fat milk mixed with Capsoil’s vitamin D

demonstrate that Capsoil’s vitamin D is distributed evenly throughout the bottle and in a stable manner.

Vitamin D concentration was analyzed on day 1 and day 14 and found identical average concentrations with good stability of vitamin D in the milk during the shelf life.

By Elizabeth Green



Inflationary victors: Frozen, canned and bakery products biggest APAC winners amidst economic uncertainty

By Pearly Neo 28-Nov-2022 - Food Navigator Asia

Frozen foods, canned foods and bakery products have emerged as the most popular food categories amongst APAC consumers amidst rising inflation and food cost increases, driven by common



themes of affordability, shelf-life and convenience.

It is no secret that factors such as the COVID-19 pandemic as well as the Ukraine-Russia crisis have contributed to rising inflation all over the world, including in the APAC region - Analytics firm GlobalData has estimated average overall consumer price inflation in the region at 3.6% in 2022, with India leading the pack at 6%.

Food prices have been amongst the most severely hit by this economic situation, not only in developing markets like India but also in developed nations such as Singapore where economic data analytics firm Trading

Economics reported food prices have increased by 6.9% year-on-year as of September 2022, with items such as meat (13.9%) and oils (8.4%) hit particularly hard.



Amidst this backdrop, there are several food categories that have emerged to become more popular amongst consumers, with the common theme amongst these unsurprisingly being affordability, longer shelf-life and convenience.

“Value purchases are very important to consumers now and they want to get as much value as possible out of their purchases, which would include attributes such as good pricing, high quality and natural ingredients,” flavours and research firm Scentium Marketing Manager Rafael Bonache told the floor at the recent Fi Asia 2022 event in Bangkok, Thailand.

“This is why items such as retailers’ private label are doing increasingly well, as these fit the value perception consumers are looking for such as containing all the basic items they would need combined with the trust they have in the retailer.

Throughout this, we have seen and are now also seeing some popular food categories emerge during times of inflation, such as frozen foods as these are affordable, taste good, are long-lasting and tend to be more affordable than fresh products. These also have the advantage over canned or highly processed products by having less preservatives as well as a large variety of products available including indulgent meal options.”

Another option is dry and canned foods, which is

particularly popular amongst consumers looking for convenient ready-to-eat (RTE) options that can just be stored in cupboards at ambient temperatures, or those without the luxury of freezers in their homes.

“Canned goods are known to be very long-lasting and are also very suitable to be purchased in big volumes for stocking up, which is attractive to consumers at this time,” Bonache added. “There are many types of food segments available from vegetables to meat to dairy and more, and it can cover all the basics required such that a lot of these can be stored for long periods of time to tide over difficult periods.”

Apart from food for basic survival needs, it is also normal for consumers to demand small enjoyments amidst difficult times - this has manifested in the form of bakery products, a common category associated with enjoyment. “During the last recession we saw an explosion of cupcakes and other indulgences, which showcases the importance consumers place on the fun factor,” he said.

“These make for convenient, affordable forms of entertainment at home that are already considered a ‘must-have’ food for celebrations, and categories such as cookies are dynamic enough to be able to accommodate constant new innovations in terms of flavours, formats, shapes and so on which keeps things interesting.”

With the fear of a recession looming, Bonache also highlighted examples of developing countries that have already been struggling with inflation for some time, with some food-related learnings made from these. “Turkey for example has been in an inflationary state since 2018, and saw 80.2% inflation in the 2021 to 2022 period - an obvious trend here was that the people started to buy much larger volumes of FMCG products to stockpile and save costs as much as possible,” he said.





“Dehydrated soups were found to be especially popular due to the stability, shelf-life and being able to be consumed as a complete meal.

Artisanal

cookies also saw a boom, which emphasizes the need for small indulgences. Another good example is Argentina, which economy has been fluctuating for many decades - consumer data has shown that over half the population (66%) is looking for cheaper products, with 63% having stopped buying from big brands in 2016.”

Keeping kids keen: Growth in Indian children's snacking market driven by convenience, health and safety

By Pearly Neo 01-Nov-2022 - Food Navigator Asia

Convenience for parents and guaranteed food safety for children are the primary drivers of growth for the kids' snacking market in India today, with the category evolving to become an increasingly important dietary occasion in the country.

Globally, the snacking sector benefitted from habits developed during the COVID-19 pandemic and its related lockdowns. In India, the children's snacking market in

particular has been seeing significant growth, with parents increasingly seeing children-targeted snacks as a convenient yet important part of their diets - with the caveat that no compromise is made on the health, nutrition and food safety aspects.

“Here in India we have definitely seen that the importance of snacking has been going up, and as mothers the occasions and frequency of providing these snacks to the kids has also been increasing,” kids' snacks brand Snack-A-Doodle Co-Founder Simer Dhall told FoodNavigator-Asia. “This was accelerated by COVID-19, and became very apparent in 2021 amidst all the lockdowns - initially mothers here have always looked at snacks as a 5pm thing previously, but after that these became increasingly important as a food that was easy and convenient to give to our children any time of the day.

“It's really common to see children, like my own son for example on a Saturday when he's off from school wanting a snack at 11am, 3pm, 6pm and this was exacerbated by everyone being stuck at home and basically wanting to constantly eat - so much so that the snacking culture essentially became habit for both parents and kids.”



Dhall emphasized that the most important thing to consider for children's snacks is not just the convenience for the parents but also the food safety factor for the children, particularly in a market like India which has had more than its fair share of food safety scares. This is why one of the main selling points of our products is to be safe, both in terms of allergen risks but also additives - so we have committed to being gluten-free, not adding any processed sugar, not adding artificial colouring, not using nuts and so on,” said Dhall.

“It is extremely important to educate all parents with regard to healthier products and the importance of health and nutrition - looking at the numbers, India is one of the largest countries in terms of childhood obesity,” she said. “So educating the parents on how necessary it is to start healthy eating and healthy snacking at an early age so that later on the child gets used to that -and is not always indulging in junk food - is very crucial.”





Monk fruit finds premium, blend-friendly sweet spot in sugar reduction space

By Asia Sherman 24-Oct-2022 - Food Navigator USA

Monk fruit, a high-intensity sweetener, is gaining popularity across premium applications as a clean-label alternative that blends well with others. While it costs more than stevia, tech innovations may bring prices down. FoodNavigator-USA caught up with some key players in the sweetener industry to see what is next for monk fruit.

“The demand from consumers for sugar reduction solutions that are not artificial suggests a bright future for monk fruit and other non-artificial sweeteners,” said Jim Carr, director of global ingredient technology for sweeteners at Tate & Lyle.

“Launches with monk fruit are more likely to feature claims linked to trends such as ‘naturalness’, ‘plant-based’

and ‘free-from’ than launches that contain any other type of intense sweetener. ”

In a global sweeteners market expected to grow at a CAGR of 4% to reach \$12.5 billion within five years, Global Market Insights reported that monk fruit applications grew at 20% in 2021, followed by stevia at 15% and sugar alcohol sweeteners at 4%.

Nancy Hughes, president at Apura Ingredients - a leading supplier of sweeteners to the North American market - said monk fruit and stevia are currently positioned in the middle-level product market but “are destined to be different in their market directions. The stevia industry is more suitable in the direction of middle-to-low and middle level markets, whereas monk fruit is more appropriately positioned in the mid-to-high or high-level product market,” she said, putting forth that monk fruit has a better overall taste and the advantage of being clean label. “At the same time, monk fruit can be mixed with different sweeteners in the market to achieve better product experience,” she added.

Other monk fruit attributes include no-calorie sweetness, the absence of blood sugar



spikes and a clear sugar-from-fruit connection. Native to southern China and first used by Buddhist monks in the 13 century, the small round fruit contains sweet compounds called mogrosides that can be up to 300 times as sweet as sugar with a slower onset of sweetness than sucrose.

They may be used alone or paired with bulk sweeteners such as allulose and erythritol to “create a sweetener that has parity with sucrose in applications making it a plugin for sugar” while providing volume to mitigate monk fruit cost, which continues to be relatively expensive compared to stevia, said Thom King, CEO at sweetener specialist Icon Foods. Monk fruit also has interesting masking and sweetness modulation qualities that really come through when monk fruit is blended with other glycosides like stevia,” King added.





“Postbiotics promise’: Morinaga on huge opportunities across functional food and beverages

By Tingmin Koe 09-Nov-2022 - Food Navigator Asia

Japanese dairy giant Morinaga has detailed how it believes postbiotics hold great promise in the future of functional food and beverages. Dr Chyn Boon Wong, lead research associate at Morinaga Milk Industry spoke about the above during her keynote presentation at Growth Asia Summit held in Singapore between October 11 and 13.

She was presenting the topic “Postbiotics for immunity and healthy ageing: The case for LAC-Shield as the next waves of biotics.”

Citing data from Innova, she pointed out that over the past five years, 85 per cent of food and beverage, as well as supplements launched in North America, Europe and APAC contained the word postbiotics as part of the product name, description, claims, or ingredients.

“The biotics space is expanding, we have prebiotics, probiotics and now the postbiotics. Due to its nature, postbiotics hold great promise

in the food and beverage segments, mainly because they are de-activated.

“They can achieve certain

delivery formats and also overcome certain manufacturing conditions that might be more challenging for live probiotics to thrive in. This is also one of the reasons why we have seen a lot of growth in the postbiotic market, because they have infinite possibilities,” she said.

So far, Morinaga’s postbiotics ingredient - heat-killed *Lactocaseibacillus paracasei* MCC1849 trademarked LAC-Shield - has been incorporated into over 1,000 types of products in Japan, including bars, cereals, energy drinks, and powder drinks.

The postbiotics was selected from several thousands of bacteria strains, including *L. bulgaricus*, *L. helveticus*, and *L. reuteri*, from its Morinaga Milk culture collection. It was selected due to its ability to induce the highest amount of interleukin-12 (IL-12) which is crucial for immune health, Dr Wong said.

“It is one of the most important cytokines that induces immune response when we are attacked by foreign invaders and also determines the subsequent immune response that our body produces to help us control resistance to infections.”



Beyond just a trend: Policy measures further pushing Asian food colouring sector towards natural

By Pearly Neo
27-Oct-2022 - Food Navigator Asia

Regulatory pressure from Asian governments will drive food and beverage firms to use natural colours, with it rapidly becoming less of a trend and more of a necessity. Natural colours and colouring foods are nothing new to the food and beverage industry in APAC, but apart from the Oceania markets of Australia and New Zealand, food firms in many Asian countries have been slower to adopt.



According to food colours specialist firm Oterra, regulatory limitations in the various markets are expected to be a big driver for companies to convert from artificial to natural options. “The trend here in APAC for food colours is definitely towards naturality, but apart from ANZ in all the other Asian markets things depend very much on the regulatory landscape,” Oterra Regional Marketing Manager Carel Soo told FoodNavigator-Asia at the recent Fi Asia Thailand show in Bangkok.

“In markets where there are no regulatory limitations to artificial colours, motivation is somewhat lower to convert even though the intent is usually present in the market due to consumer demand as a result of health consciousness. One very clear example of this is taking place in Malaysia - previously food firms have only been required to use the term ‘permitted colour’ on their labels when using food colouring, and really this could be artificial or natural so many firms would go for the more economical option.

“But now there are plans at the regulatory level to require manufacturers to put the colours and actual ingredients or additives used into the ingredient list, and this is

expected to be enforced come 2024. As a result, we have seen a lot more enquiries come in regarding natural options or colouring foods, as brands that do not want to be associated with artificial ingredients will now be thinking twice before including any additives that carry E numbers.”

Prior examples of this also already exist in other regions, such as in the Middle East. “GCC regulations require food manufacturers that use any artificial colours to include a warning label on their products highlighting their use of these,” said Soo.

“Such a warning label is definitely going to be a turn-off for consumers, so by doing this the governments there are also encouraging the industry to move away from artificial. This is already happening there, so in Asia, it is also very likely that regulatory measures can act as the catalyst needed to get the food industry to convert to natural options.”

While colours in foods are often linked to the visual appeal of products, Soo highlighted that today more focus is placed on the impact of colours on consumer emotions. “Especially in the COVID-19 era where mental wellness has become such an



area of focus, colours have emerged as having a very important role to play in promoting positive emotions,” she said.

“As an example, we have seen several large brands make a play on using colours to reach out to consumers such as one company launched the Moodbreakers range that included pink bars to encourage excitement and yellow to show cheerfulness. So now when working out how to create or select colour matches for food and beverage products, the emotional aspect and the impact it can have on consumers must be taken carefully into consideration as well.”



REGULATORY NEWS

Whole grain confusion: Researchers call for clearer regulation and labelling to boost consumption

06 Dec 2022 Nutrition Insight

The consumption of whole grain foods remains low globally, despite widespread promotion of health benefits and dietary recommendations.

An Australian-based study published in the Journal of Nutrition Education and Behavior has found overall confusion about whole grain foods and scepticism due to a lack of transparency and guidance on food labels.

“Without clear regulation and labelling standards, the benefits of educating consumers on how to increase

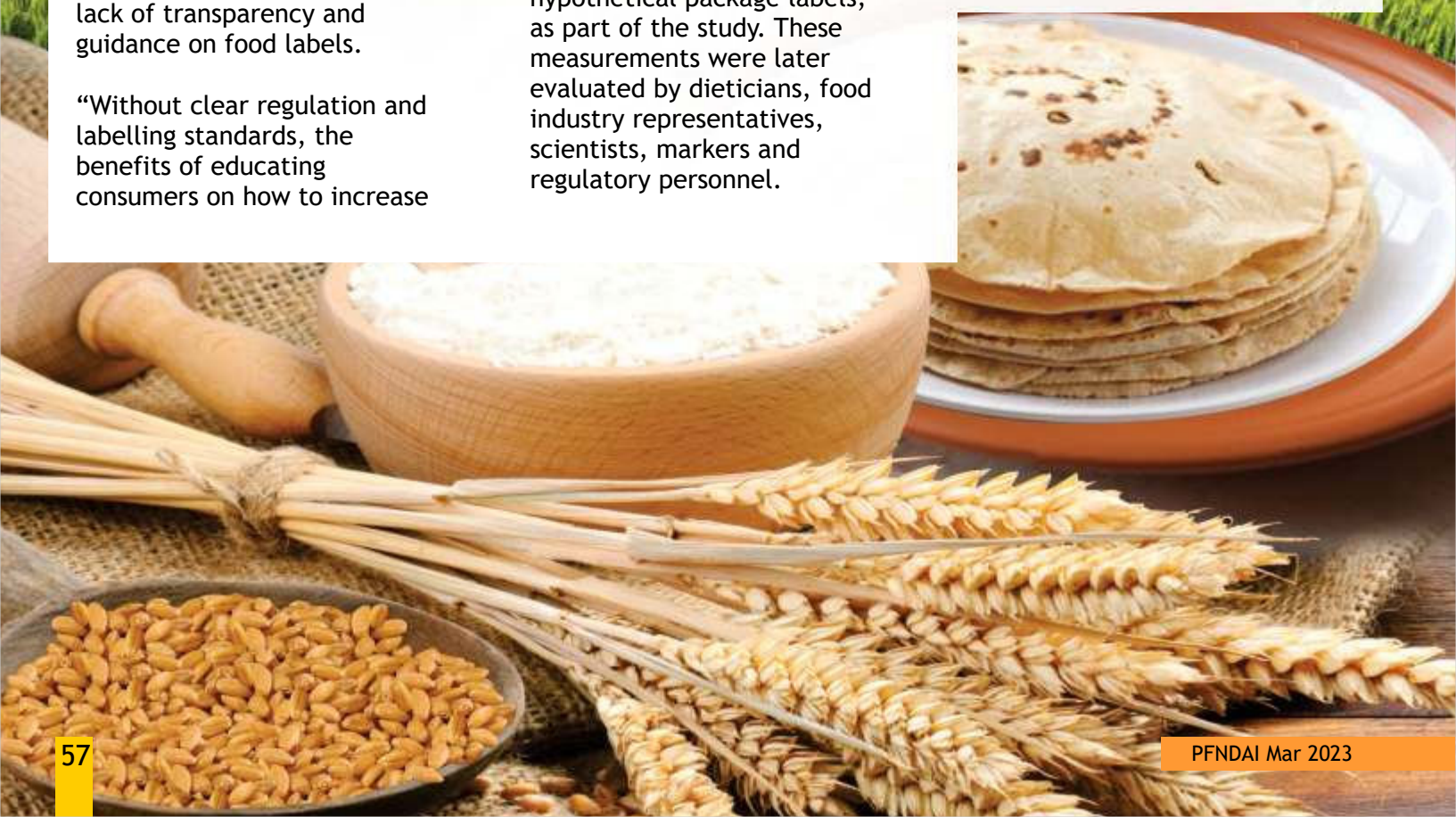
whole grain intake may be lost,” says lead author Katrina Kisson, accredited practicing dietitian and researcher at the school of medical, indigenous and health sciences, University of Wollongong, Australia. “This study supports the need for a global whole grain labelling system based on standardized definitions to help consumers make informed food purchases.”

Open questions were put forward to consumers on grain food choices and whole grain consumption, identification of whole grain foods, perception of labelling and opinions on hypothetical package labels, as part of the study. These measurements were later evaluated by dietitians, food industry representatives, scientists, marketers and regulatory personnel.

The study showed overall scepticism among the participants on labelling whole grain foods. During focus group discussions, they commented, “I don’t know what 16 g of whole grain per serving means,” or “I don’t know how much whole grain a product has to have to get a label. Does it mean 5% or 3%?” The participants also expressed scepticism about marketing a product as “healthy,” overall labelling, health star rating and whole grain content claims.

The study showed that consumer preference was more substantial for products with the given percentage or amount of whole grain. Additionally, they tend to choose products with whole grain in the name rather than those with “contains whole grain” somewhere on the packaging.

Edited by Beatrice Wihlander



TiO2 alternatives: Industry ramps up clean label moves away from titanium dioxide

02 Dec 2022 Nutrition Insight

After EU regulators deemed the European Commission decision to ban titanium dioxide a “manifest error” of assessment, the status of TiO₂ is being questioned once again. However, industry has been moving away from the colorant for some time now.



Companies are finding fast alternatives to the whitening agent, as a ban on TiO₂ is in full force in the EU. At the same time, its use is still allowed in the US and Canada and the UK will finalize its decision on the topic in 2023.

According to some sections of the US F&B arena, replacements require studies and regulatory filings, which take time, and reformulation cost estimates range from US\$600,000 to US\$1.8 million per product, depending on the complexity.

By Marc Cervera



Words matter in food freshness, safety messaging

Science Daily November 4, 2022

A survey of consumers found that certain wording -- "best by," as opposed to "best if used by," for example -- had the potential to reduce food waste, but that results varied depending on the type of food in question. Predictably, the more perishable a food item, the greater the likelihood of discarding it. This work has implications for both policy proposals regarding date labels and the market impacts of reducing food waste.

“Some consumers might do a sniff test to see if food is still good, while others might just look at the date label and throw it away,” said Brad Rickard, professor in the Charles H. Dyson School of Applied Economics and Management, and senior author of “Date Labels, Food Waste and Supply Chain Implications,” which published in the European Review of Agricultural Economics.

“And the truth is, with very few exceptions, these date labels that are used in the

United States are not regulated,” Rickard said. “And they’re not food safety dates; they’re just food quality dates.”

Co-authors were Shuay-Tsyr Ho, assistant professor of agricultural economics at National Taiwan University; Florine Livat, associate professor of economics at the Kedge Business School in Talence, France, and a former visiting scholar at Dyson; and Abigail Okrent of the U.S. Department of Agriculture's Economic Research Service.

Rickard and his colleagues found that the words “use” or “use by” seemed to speak more directly to the perceived food safety implications of consuming food past the date listed on the package, and could therefore lead to an increase in food waste. The wording “best by” seemed to refer solely to food quality beyond a certain date and led to less waste.





included one of 10 different wording variations.

Four of the date label variations followed those that

The motivation for this work, Rickard said, stems from the "wild west" landscape of food date labels which is expected to be driven, in part, by manufacturers' desire to sell more product. Nearly a year ago, the Food Date Labelling Act was introduced in both the U.S. House of Representatives and the Senate in an effort to reduce the discarding of safe food.

"You go into the yogurt section at the grocery store," he said, "and you see many different labels -- some say 'use by,' some say 'best by,' some say 'best if used by' or 'fresh by,' 'sell by.' And there are no rules about this."

In the survey, the researchers asked participants to rate, on a 1-5 scale (5 being extremely likely) their likelihood of discarding 15 different food and beverage items that were one day past the stated date code. In the first section of the survey, the question included only the expiration date code (i.e. date/month/year); the second section repeated this exercise but with both a date code and a date label that

have been widely adopted in the U.S.: "Best if used by"; "Best by"; "Use by"; and "Sell by." The other six featured a date label and a biosensor, a visual indication of food quality. Biosensors -- which detect microbe growth and change colours accordingly -- are popular in some European markets, but are not as common in the U.S.; for the survey, the researchers chose biosensors with the colours green (fresh), blue (less fresh) and purple (past fresh).

The 15 food items selected for the survey -- including bread, cookies, chicken, packaged salad greens and canned soup - all typically use date labels. Survey results showed an increase in discard intentions with the "Use by" and the "Best if used by" date label, inferring that food with these date



labels were more often discarded and replaced.

Rickard also said the novelty of the biosensor technology resonated with the U.S. survey participants, and when it was presented to participants as green (fresh), it led to substantially lower discard rates.

One of the unintended consequences of a more uniform approach to date labels, the researchers note, is a potential increase in food waste depending on the

wording of the label, as well as an increase in the re-purchasing of perishable items high in protein, fat and cholesterol.

"If you tell all food manufacturers that all their 'best by' dates are now going to 'best if used by' dates, that might actually increase food waste," Rickard said.



India Proposes Food Safety and Standards (Additives) First Amendment Regulations

Jan 12, 2023, Selerant:
Ashwanandhini Govindarajan

On January 11, 2023, the Food Safety Authority of India published a regulation on the “Food Safety and Standards (Food Products Standards and Food Additives) First Amendment Regulations” per section 92 of the Food Safety and Standards Act.

The document proposes the following information for consideration:

- Under the “General Standards for Milk and Milk Products”, clause 1subclause F (vi) shall be substituted with “dahi, skimmed milk dahi;
- Clause 2.1.2 for Standard for Milk and 2.1.13 on Standards for Fermented milk product have been revised;
- Basmati rice and Blended rice shall conform to the standard specified in the regulation for their physicochemical and microbial

attributes;

- According to Clause 6 of regulation 2.7.4 for chocolate, the phrase “contains vegetable oil in addition to cocoa butter” is replaced by the phrase “contains cocoa butter equivalent to butter/vegetable fat in addition to cocoa butter”;
- The tables under Appendix A on “Use of food additives in food products” and Appendix C “Use of processing aids in food products” have been amended.

The regulation shall come into force on August 01, 2023, except regulation 2.6 on “Limits of formaldehyde” which shall come into force on the date of the publication in the official gazette.

India Proposes Food Safety and Standards Amendment Regulations 2022

Nov 3, 2022 Selerant:
Ashwanandhini Govindarajan

On November 2nd, 2022, the Food Safety and Standards Authority of India published a notification on the “Food Safety and Standards (Food Products Standards and Food Additives) Amendment Regulations, 2022” as required by section 92 Food Safety Standards act of 2006.

The document proposes the following changes for consideration:

- The regulation will amend the previous “Food Safety and Standards (Food Products Standards and Food Additives) Regulations, 2011” version;
- Regulation 2.2 shall be amended for the following clauses related to Palm oil, Palmolein, Palm Kernel Oil and Palm Superolein;
- The standards on food additives, food contaminants and food hygiene requirements for Sweets and Snacks shall conform to the Food Safety and Standards (Licensing and Registration of Food Businesses) Regulations, 2011;
- Labelling shall conform to the Food Safety and Standards (Labelling and Display) regulations, 2020.





from GMOs containing modified DNA;

- Food ingredients produced from GMOs that do not contain modified DNA and include ingredients/additives/processing aids derived from GMOs;
- The requirements exclude genome-edited crops of SDN1 and SDN2 categories;

India Publishes Food Safety and Standards (Genetically Modified Foods) Regulations, 2022

Nov 21, 2022 Selerant:
Ashwanandhini Govindarajan

On November 18, 2022, the Food Safety and Standards Authority of India published a notification on the “Food Safety and Standards (Genetically Modified Foods) Regulations, 2022” as required by section 92 Food Safety Standards act of 2006.

The document summarizes the following provisions for consideration:

- The regulation applies to Genetically modified organisms intended for food use, food ingredients produced

- Prior approval from authority is required for the manufacture, sale, and import of any food or food ingredient produced from GMOs;

- All GM foods shall comply with the packaging and labelling requirements specified under the Food Safety and Standards (Packaging) Regulations, 2018, and Food Safety and Standards (Labelling and Display) Regulations, 2020.

India Publishes Food Safety and Standards (Vegan) Amendment Regulation 2022

Dec 22, 2022 Selerant:
Ashwanandhini Govindarajan

On December 21, 2022, the



Food Safety and Standards Authority of India proposed notification on the “Food Safety and Standards (Vegan Foods) Regulations, 2022” as per section 16 of the Food Safety and Standards Act, 2006.

This notification emphasizes the following points:

- Sub-regulation (2) of regulation 4 specifies the requirement on “Every package of vegan foods, after the approval, shall carry the logo as specified in the regulation;
- The logo shall comply with the specified dimension as provided in the regulation;
- The food authority shall well receive any objections and suggestions on the draft regulations on or before the expiry of the specified period;
- The draft regulations shall be taken into consideration after the expiry period of sixty days from the date of publishing in the Official Gazette.

