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SWEET SURRENDER: EMERGENCE AND SELECTION OF SUGAR REPLACERS

Dr. Vidya R. Sridhar

WHAT DOES QUANTITY OF DECLARED NUTRIENTS ACCORDING TO ESTABLISHED PRACTICE MEAN?

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EDITORIAL

Should We Teach Nutrition to Consumers?

We are providing a lot of information to consumers by way of label and also the manufacturers promoting their products through ads and advertorials etc. Quite a lot of that information is of technical nature. Do the consumers understand all that is told them? Can they make an informed decision on the basis of what information is provided to them, so they get a fresh or properly preserved food product of the desired quality with respect to nutrients as well as in relation to sensory and safety aspects?

There have been some attempts by researchers to find out whether the consumers understand what regulators and manufacturers want them to understand about the product and process. It was no surprise to them to realise that there is a big gap between the intent of information and the actual effect on consumers. We need to understand more about it and then take corrective measures to ensure that consumers can really make a proper choice.

We also need to realise that not every piece of food that goes into mouth need to be nutritionally balanced. The nutrition tells us that the diet consisting of several meals during the day needs to be balanced so some products may have more of something but less of others. Ultimately the all the foods balance each other and we get the proper diet.

However, there is a catch. If we do not caution the consumers about the excess of some of ingredients such as fat, sugar and salt, they may just not worry about the balance and only eat what they like more. That is why we need both the system of ranking as well as some nutrition knowledge imparted to the consumers so they make proper selection of foods and products in the supermarket and then eat properly using their own knowledge of nutrition and the label information.

We certainly need to provide nutrition knowledge not just in the schools when students are learning, so they can grow up to be consumers with good knowledge of nutrition. However, there may be a gap between when they learn and when they practice, so there should be another unconventional means to educate consumers. This ensures to update their knowledge so they can make a proper choice. They also may appreciate the warnings and other notices which are written on the labels.

Today's environment with webinars, net, social media and many other formats makes it ideal for our nutrition educators to devise a format of unconventional and attractive way to teaching the consumers the nutrition science elements that are essential to empower them to become knowledgeable consumers.

Prof Jagadish Pai,
Executive Director, PFNDAI

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FOOD FOR THOUGHT OR THOUGHT FOR FOOD

GEROBIOTICS! MICROBES FOR HEALTHY AGEING!

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Hon. Scientific Director, PFNDAI

Trillions of microscopic organisms, mostly bacteria and Viruses live within our gut.

Many are associated with the aging process and age-related diseases. Gut immune response and microbiota composition are impaired in elderly. Since more than 70% of our immune cells are in the intestines, it is understandable that the gut microbiome is constantly influencing the immunity. The bacterial composition in the gut is constantly changing right from birth, partly due to the changing diets and due to the age-related immune challenges. Good gut health and an efficient immune system is maintained by a balance between the good and bad bacteria in our gastrointestinal tract.

Firmicutes, Bacteroides, Actinobacteria and Proteobacteria are the major groups of gut bacteria, and their relative proportions change with diet, disease and age. Disturbed gut microbiome or Dysbiosis could be either due to changes in the relative proportions of the various species and strains or due to decreased functionality of even the good species. Interventions to set right the microbiome could be through Untargeted interventions like

- Diet
- Exercise
- Probiotics, Prebiotics and Postbiotics
- Heterologous and Autologous Fecal Microbial Transplant (FMT)

Common conditions in the elderly which result in gut dysbiosis and are likely to benefit with the use of any of the above interventions are
Anti-biotic associated diarrhoea
Pouchitis and diverticulitis
Lactose Intolerance
Irritable Bowel Syndrome
Vaginitis

Aging is associated with heightened inflammation within the body due to an altered response of the gut immune system as a result of dysbiosis, poor diet and non-communicable diseases. In recent pandemic, higher levels of morbidity and mortality were observed in older individuals with higher levels of inflammatory markers. Healthy gut can keep this inflammation to the minimum.

New knowledge about the gut microbes and their bio molecules like some neuro transmitters which communicate with the brain and nervous system , are now associated with neuro degenerative disorders and offers hope in managing them with specific probiotics in future. Probiotics are also emerging as alternatives to anti biotics in the back drop of rising multi drug resistance.

Frailty in the elders, related to loss of muscle mass is also related to greater levels of inflammatory cytokines. Good diet and gut health may help slow the process of age associated muscle loss.

Gerobiotics is a newly coined term for probiotics that can be beneficial to manage the problems in the elderly. The future may provide a better quality of life to seniors through the evidence based judicious use of Gerobiotics.

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REGULATORY VIEWPOINT

AUTHOR
Dr Joseph I Lewis,
Chairman, Regulatory Affairs, PFNDAI

• AUS rule proposal will allow manufacturers label their products "healthy" only if they contain a certain amount of such foods as fruit, vegetable, whole grain or others indicated. They must also stay within specified limits of certain nutrients, such as saturated fat, added sugars and sodium. The term "healthy" is an implied nutrient content claim and like the explicit claims "low fat" or "high fibre" should be subject to conditions. The regulatory thinking is significantly changing from labelling of only limiting individual nutrients to also promoting nutrient dense foods. NDF is being defined as "a characteristic of foods and beverages that provide vitamins, minerals and other substances that contribute to adequate nutrient intakes or may have positive health effects with little or no solid fats, added sugar, refined starch and sodium. Stakeholder comments and discussions are ongoing since 2016 and closed in 2022. Use of the term on labels or in labelling will attract new compliance conditions, once finalized.

• The Institute of Food Technologists believes that "labelling of individual foods as "healthy" has the potential to be misleading. The term "healthy" should be read in the context of the overall diet to help promote healthy eating patterns (or behaviour-comment added). Further, the amount and frequency of consumption of an individual food, including those labelled as "healthy," in the context of overall eating patterns is important (food frequency-comment added). Foods which exceed recommended limits for sodium, added sugars and saturated fat should be excluded from being labelled "healthy".

• Typically, foods that will attract the "healthy" claim are fruits, vegetables, whole grain, seafood, unsalted nuts and seeds, fat free and dairy products lean meats and poultry. Fortified foods and dietary supplements may be useful in providing one or more nutrients that otherwise may be consumed in less-than-recommended amounts.

• Some argue the food group "serving" or "equivalent" approach might count all forms of fruits and vegetables—including juices or dry, powdered, or concentrated forms—to qualify for a "healthy" claim. This would likely lead to "healthy" processed foods that are not as healthful as fresh fruits or vegetables. Only minimal processing would make the list, raw, frozen, canned, dried, or processes that do not alter the nutrient profile. There is agreement that saturated fat is more important and total fat: encouraging predominance of mono and polyunsaturated fats.

• Reasons are compelling for consumer "informed choice" or necessary to thwart misleading claims. Such generalized reasons subtract from true purpose. What exactly is the new messaging to consumers? And what is nutrition science revealing now, unknown earlier? We began by advising consumers to choose appropriate number of servings from the food pyramid for balanced and varied diets. Hectic lifestyles however made this improbable. To address concerns of non-communicable diseases (NCDs), amounts on total fat, saturated fat, salt and sugar were declared on labels. Now to claim foods "healthy" there must be certain amounts of fruits, vegetables, grain. Is this not reminiscent of the general advice - varied and balanced diets? So, given the choice why label foods "healthy"?

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SWEET SURRENDER: EMERGENCE AND SELECTION OF SUGAR REPLACERS

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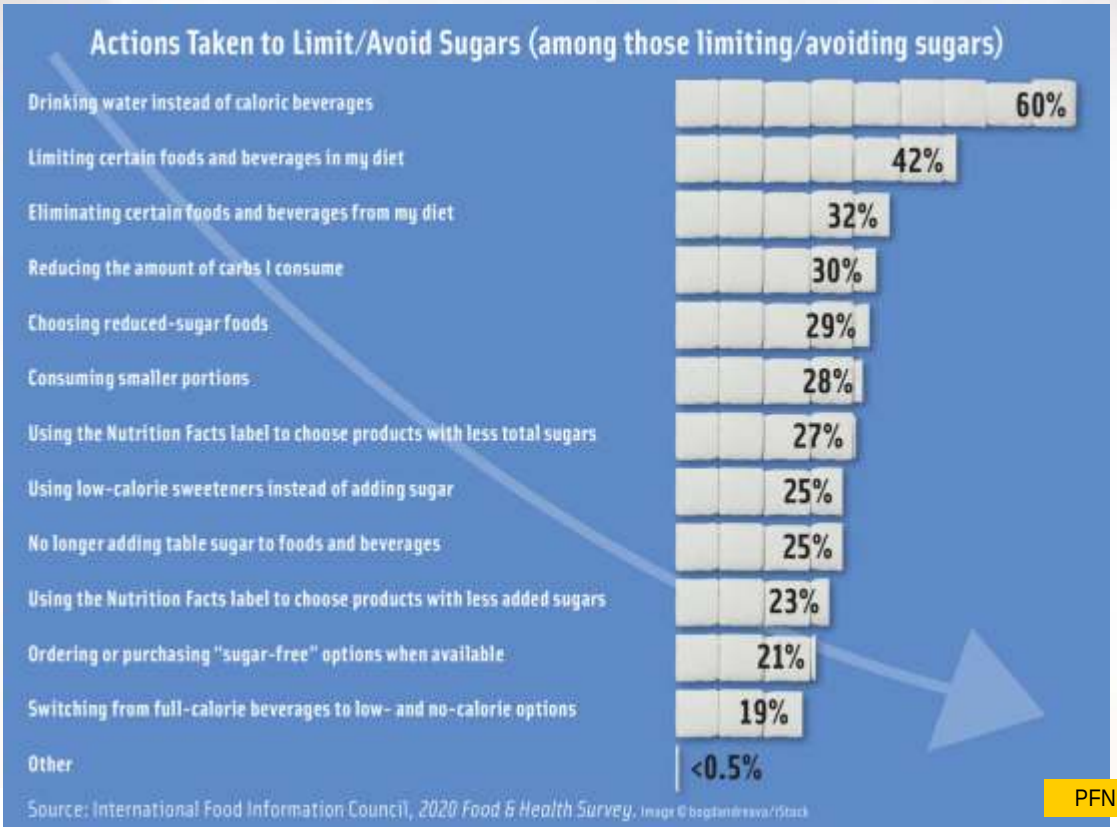
India faces a major epidemic of diabetes and overweight/obesity among adults and children and there is a growing awareness among consumers around consumption of excessive sugar in their daily diet, especially processed foods that provide empty calories with negligible nutrition. According to a food and health survey in 2020, there was a trend towards healthy living with numerous actions from consumers to reduce intake of sugar as illustrated in Figure 1 (1).

Figure 1. Actions Taken to Limit/Avoid Sugars (1)



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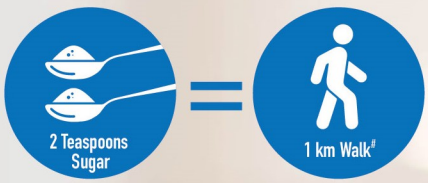

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*Claim based on considering 2 teaspoons (10 g) Sugar = 40 kcal. Approx. energy expenditure by 60 kg man in walking 4 km/hr =160 kcal/ hr (Dietary Guidelines for Indians – A Manual, NIN, ICMR, 2011). Calories burned during physical activity depends on varied factors including body weight. ^Product contains Steviol glycosides which is derived from natural source i.e., Stevia plant leaves. #Refer pack for more details . **MRP is inclusive of all taxes

Before we deep dive into how to replace sugar in foods, let's first understand how sugars are defined and regulated in India, what the typical dietary allowance are for sugars.

Food Safety and Standards Authority of India (FSSAI) states in its food standards that for low sugar, the maximum amount of sugar per 100 g of solids is 5g and per 100 ml of liquids is 2.5 g, while for sugar-free products, the maximum amount of sugar per 100 g of solids or 100 ml of liquids is 0.5 g. Additionally, the recommended daily allowance for added sugar as per a 2000 calorie diet is 50g of added sugar with total sugar contributing to less than 10% of total calorie intake.

Sucrose is a widely used form of sugar due to its availability, cost, and suitability as sweetener in packaged foods and previously, only sucrose was declared as Added Sugar (as sucrose) on the Nutrition Facts label (NFL). However, recently, FSSAI, has defined "sugar" as those that include all monosaccharides (glucose, fructose, etc.) and disaccharides (maltose, sucrose, lactose, etc.) aka simple sugars and has amended the NFL to include both Added and Total Sugars.

Added sugars are those that get added intentionally, while total sugars include, added sugar plus any other naturally occurring sugars in formulation such as those from fruit concentrates & pastes, fillers such as maltodextrins, skimmed milk powder, natural sweeteners such as jaggery, molasses, syrups from corn, rice, agave & tapioca, honey, dates etc. These sugars could be present in the formulation at ingredient or sub-ingredient level or generated during processing or during shelf life due to interaction with matrix.

To enable consumers to effectively discern healthy foods, FSSAI recently has proposed a front-of-package labelling (FOPL) regulation, like a traffic light signal with labels carrying a RED dot if they have high levels of sugar, sodium, and saturated fat (HSSS) (2).Thus, with growing vigilance from regulations and consumer awareness on excessive use of sugar, sugar replacement has indeed become the new normal.

While there are many different types of sugar substitutes available, each with its own unique benefits and drawbacks, replacement or reducing sugar in foods is not so easy and will be costly. This is because sucrose or sugar is cost effective functional ingredient that plays multiple roles in food other than imparting sweetness. Understanding sugar's functional role in food format and the goal for sugar replacement by asking important questions will together drive the selection of the sugar substitutes.

Are we trying to reduce calories, increase or reduce sweetness, or replace the sugar in a product? What claims are important? Reduced calories, Low sugar or Sugar free? Do we want to use Artificial or Natural sweeteners? Do we want the finished product to have essentially the same taste and appearance as a traditional product? How long a shelf life is required? Or is the product required to be processed at high temperatures and acidity?

Some sweeteners may not hold up well in an acidic condition over time, or break down at high temperatures, while others may develop a metallic taste when heated. The various sweeteners interact differently with food ingredients, so the flavouring acid/sweetness ratio may require modification. Some sweeteners enhance fruit flavours or can have a bitter aftertaste.

Similarly, understanding sugar functionality is key in identifying the right sugar substitute. Sugar's functional roles include freezing point depression, crystallization, browning, viscosity/body, solubility, starch gelatinization, controlling water activity and moisture migration, crystallization and porosity, plasticizing, serving as a bulking agent, providing structure in baked goods and confectionaries, providing mouthfeel in combination with hydrocolloids in juice drinks and milkshakes, acting as a binder in bars, and providing textures in a range of products such as frozen desserts, and gummies (3).

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Complex food systems, like ice cream, sweet baked goods sugar replacement requires the use of multiple ingredients to make up for the functional losses of removing sucrose. In gummies or confectionaries that are primarily made of sugar, a heat stable bulking agent is needed to provide the structure or texture to the gummy. In nutrition bar, sugar binds moisture and reduces hardening of bars and a suitable gum or binder needs to be added. Reducing or removing sugar from a product formulation may sometimes require changes to the process to maintain flavour, texture, quality, and shelf life, independent of formulation changes(4). Thus, choosing the right combination of sugar replacers based on its application with inclusion of certain functional additives becomes important for cost-effective solutions in sugar replacement.

Sugar substitutes fall into two broad categories: those which are essentially calorie free, often referred to as low-calorie or intense sweeteners, and those which are significantly reduced in calories, which may be referred to as reduced calorie-sweeteners, bulk sweeteners, or sugar replacers (5). The high intensity sweeteners can be of artificial or natural origin. Artificial sweeteners are low-calorie/calorie-free sweeteners/Non-Nutritive sweeteners (NNS) that have very high sweetness intensities than sugar (Table 1) without the added calories or impact on blood sugar levels (6).

Table 1: Examples of Artificial Sweeteners(6)

Artificial Sweeteners	X Sweeter than sugar	Brand names	ADI (mg/kg body weight per d)
Aspartame	200	Nutrasweet	50
Acesulframe-K	200	Sweet One	15
Saccharin	600	Sweet N' Low	5
Sucralose	300	Splenda	5
Neotame	8000	Newtame	2
Cyclamate	30	–	1
Alitame	2000	–	0-1
Advantame	37000	–	5

Natural high intense sweeteners are derived from plants and are less processed than artificial sweeteners. Stevioside, a component of the Stevia rebaudiana leaf (RebaudiosideA), is a well-known non-caloric sweetener (250–300 times sweeter than sucrose) substituting sugar at 30-50%. It is popular in its use and is approved by FSSAI with limitations on its use levels. New rebaudiosides (Reb M, Reb D) are gaining popularity, for substituting higher % sugar with very little aftertaste. Monk fruit (*Siraitiagrosvenorii*) commonly called as Luo Han Guo is a perennial herb from China. The mogroside extract of monk fruit gives 300 more sweetness as compared to 5% sucrose solution without giving extra calories during consumption (7). However, both have lingering aftertaste and bitterness that needs masking. Any intense sweetener cannot replace the physical functions of sugar. Hence one must wisely choose the bulking agent based on the food application or format.

The bulk sweeteners are from plant sources and their selection is driven by their functionality and stability in specific food formats. Most of these are pre-biotic in nature known to reduce the glycemic index. An added advantage is that dietary fibres such as inulin, oligosaccharides (various), polydextrose (glucose polymer) and polyols (sugar alcohols) are also listed as a nutrient, Prebiotic compounds in FSSAI standards (Table 2), with certain limits on their use. One of the drawbacks of certain fibres such as inulin or oligosaccharides is that they break down when exposed to high heat or acidity to simple sugars, thus limiting their use in products that have sugar-free claims.

Table 2: Schedule VIII – List of Prebiotic compounds (FSSAI standards)

S. No.	Prebiotic Compounds
1.	Polydextrose
2.	Soybean oligosaccharides
3.	Isomalto-oligosaccharides
4.	Fructo-oligosaccharides
5.	Gluco-oligosaccharides
6.	Xylo-oligosaccharides
7.	Inulin
8.	Isomaltulose
9.	Gentio-ologsaccharides
10.	Lactulose
11.	Lactoferrin
12.	Sugar alcohols such as lactitol, sorbitol, maltitol, inositol, isomalt
13.	Galacto-oligosaccharides

Note: The Food Authority may add any new specific prebiotic after proper scientific evaluation and include in this schedule

Polyols also known as sugar alcohols or polyhydric alcohols, on the other hand are more stable to heat and acidity and preferred as bulking agent in such applications that require heat and acidity such as ready to drink beverages, baked products and confectionaries (8). Polyols are modified sugars that are partially digested leading to their low caloric value (1.6-3.0 kcal/g) than sugar lowering the blood glucose response (9) with a wide range of sweetness index and solubility (Table 3).

When combined with NNS such as Stevia or sucralose, polyols offer cost effective solutions for sugar replacement by enhancing taste and flavour, providing texture, act as humectants and thickeners in baked goods, confectionaries such as hard candies and gummies, spreads, yogurts, and beverages (10). However, polyols do have laxative effect leading to bloating and diarrhea if consumed at high levels. To prevent digestive discomfort, the intake is limited to 40–50 g for adults and 30 g for children each day (11).

Other sugar substitutes include maltodextrin (polysaccharides with glucose polymers) and resistant dextrins, functional starches, stabilizers. There are a few new-age clean label rare sugars such as Allulose (0.2 kcal/g, 70% sweeter), Trehalose & Isomaltulose (4 kcal/g, 50% sweeter), and Arabinose (0 kcal/g, 50% sweeter) (12). However, their use is limited in India by cost, availability, and regulatory approvals.

Table 3: Sweetness Index and Solubility of Polyols vs. Sucrose (8)

Polyol solubility compared to sucrose.	
Polyol	**Solubility at 25°C (g/100 g H_2O)**
Sorbitol	235.0
Xylitol	200.0
Sucrose	185.0
Maltitol	175.0
Lactitol	140.0
Erythritol	61.0
Isomalt	39.7
Mannitol	22.0

Polyol sweetness compared to sucrose.	
Polyol	**Relative Sweetness to Sucrose (%)**
Sucrose	100
Xylitol	100
Maltitol	90
Erythritol	60
Sorbitol	60
Mannitol	50
Isomalt	40
Lactitol	30–40
Maltitol syrup	70–80
Polyglycitol syrup	30–50

Overall, the use of sugar substitutes in India has become increasingly popular in recent years, as individuals seek out healthier alternatives to traditional sugar. Maintaining product rheology or texture while delivering an appealing flavour and sweetness and minimizing health issues are the key challenges for sugar substitution. A comprehensive approach is necessary when choosing the right sugar substitute, one that must satisfy sensory standards and, ideally, enhance the nutritional profile of the product while keeping it cost effective. Many studies have proven that high intense sweetener can both partially and entirely replace sucrose when combined with low-calorie carbohydrate (oligofructose, maltodextrin and polydextrose) or polyols to achieve the desired sweetness, texture, and flavour in sugar substituted foods.

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WHAT DOES QUANTITY OF DECLARED NUTRIENTS ACCORDING TO ESTABLISHED PRACTICE MEAN?

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Chairman, Regulatory Affairs,
PFNDAI

It is well recognized that nutrient(s) added or present in foods when measured may differ from amounts declared on labels. This is due to uncertainty in measurement and influencing ecosystems. With this foreknowledge, the nutrition labelling regulation 2008, stated that "compliance to quantity of declared nutrients on the label would be according to the established practices". The regulator may have taken a broad view until specific guidance could be worked out in due course. Meanwhile businesses declared nutrient values as "approximate or typical", citing Indian food composition tables, and other databases. These databases were used for compliance purposes, as tolerances were yet to be set. Tolerances are set so that measured values are not too wide of the declared value. However this is not the same as "approximate or typical".

The word tolerance, and its true meaning, entered regulatory texts quite recently. Over several years closely related expressions were used but the term tolerance was never explicitly stated. Iodized salt, under a product standard (15.01:PFA), requires 150µg of iodine per 10g to be delivered to the consumer. To ensure this will happen (enforcement), the package should have no less than 30ppm at entry to market. This could be read as a tolerance limit "which includes an overage" in order to meet 100% the declared amount; during product shelf life. However, declaring the amount as "iodine>15ppm" makes one wonder if this was meant to be a beneficial nutrient message for the consumer or merely a product specification?

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SCAN FOR **FREE SAMPLES**

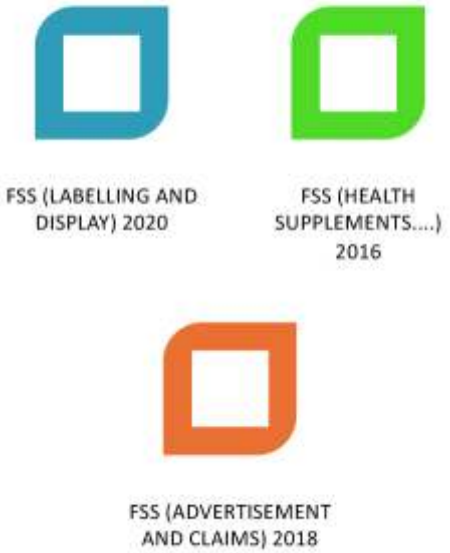
Then there is the case of fortified foods [FSS (FF) 2018] where the language is tricky. Regulation 4(1) requires any manufacturer who fortifies any food to ensure that the level of added micronutrients does not fall below the "minimum level" specified in Schedule-I. Where a minimum value is specified, it must meet 100% of the declared amount to stay in compliance. For example, would the lower limit of a "± 20 % tolerance be applicable to a vegetable oil product declaring 600µg of vitamin A(minimum level) per 100g? Interestingly, there is a reason for most oil brands declaring a mid-range amount of 750µg. A review of these regulatory texts ought to be done before any guidance on tolerance is taken up.

Declare nutrient amounts for informed consumer choice

Labelling is a pre-purchase information opportunity for consumers to examine and/or compare product value. The thinking must be clear when declarations are required to avoid label clutter. Edible oil product labels typically provide 12-14 nutrient declarations, three of which are zero. When nutrient(s) are negligible or insignificant, these may not be declared. FSS (LD) 2020, is the general regulation which specifies nutrients to be declared in the nutrition information panel. Given that FSS(HSN) 2016 addresses comprehensively the supplement category - delivered in tablet, capsules, pills, liquids and such forms - provisions under FSS(LD) 2020 do not apply.

Instead, "the amount of the nutrients vitamins or minerals or substances with a nutritional or physiological effect" contained in the product are declared in the nutrition information panel or as supplement facts. Nutrition labelling becomes mandatory when nutrition and health claims are made. When claims are made the nutrient or substance must be at the threshold levels prescribed; these minimum amounts are given in annexures under FSS (AC) 2018. Nutrient declarations are not attracted except when specified. This prevents clutter.

Fig. 1 Regulations on nutrient declared amounts



What is "established practice"

Regulatory texts on tolerances include terms such as rounding of numerals, overages, tolerance criteria and finally compliance to declared amounts. Tolerances expressed in a numerical form of "maximum minus 10 percent", first appeared in the labelling regulation (LD 2020), thereafter amended to "± 20 percent". A change within 2 years raises the question whether these are ad hoc or arrived at after considering 'established practice'. Rounding is one such factor.

Rounding guidelines on the number of significant figures or decimal places to be declared should be set to avoid implying a level of precision which is untrue. Neither is it reproducible nor likely to impress a consumer.

Rounding of a declared value is taken into account in determining tolerance between the laboratory test result of the competent authority and the declared amount. Rounding benefits consumers most for easier recall, while keeping numbers close to the true value.

There are several guidance documents, such an EU Commission (1), for reference. Secondly in establishing tolerance ranges, due recognition needs to be given to measurement uncertainty and nutrient stability.

All factors such as nutrient concentration, food matrices, method of analysis, applicability, sensitivity, precision, repeatability, reproducibility, limits of detection and determination, taken together contribute to measurement uncertainty.

Overages consistent with good manufacturing practice

Apart from measurement uncertainty there is also nutrient instability due to manufacturing, environmental and supply chain conditions.

Compensatory overages are required to ensure delivery of declared amounts. Nutra 2016 (Sch. I: Table C) provides overages for vitamins and minerals, some of which are illustrated (Fig. 2).

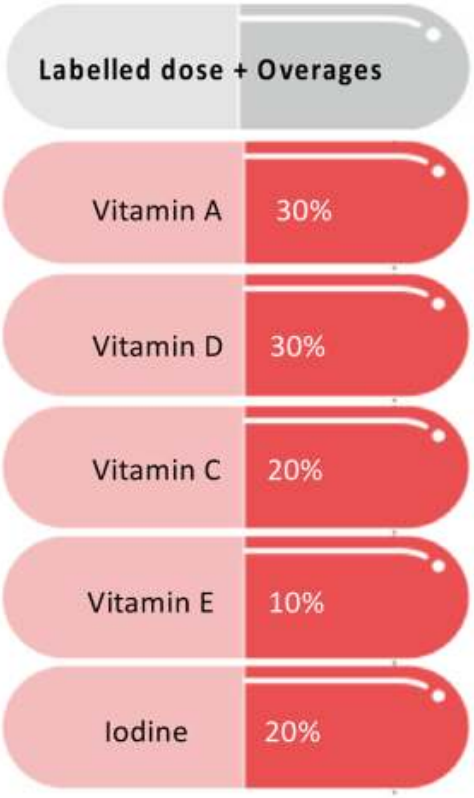
The nutrient may exceed the declared amount, by a percent overage amount of, e.g. + 30%. The regulatory thinking is that overage values should be consistent with good manufacturing practice (scientific rationale) and should not present a health risk. Manufacturers are best placed to determine scientifically the overages required for their products/categories.

An overage for vitamins and minerals may exceed the permissible limit of 1 RDA; an overage above this does not present a risk and constitutes acceptable 'established practice'.

Determination of compliance to declared values.

EU Commission (1) describes tolerance as "the acceptable differences between the nutrient values declared on a label and those established in the course of official controls", (emphasis added).

Fig. 2 Permissible Overages Sch. I Table C FSS(Nutra) 2016



Official controls, relates to laboratory test results of the competent authorities (Public Health and/or Notified Laboratories). These lab results decide compliance to nutrient declarations on labels. Non-compliance follows when the test result of the competent authority falls outside prescribed tolerance.

Nutrient declarations – on the label – by FBOs present the best average "true value" derived from testing multiple lots over a wide time frame. Whether the scatter characteristics (bias, precision, accuracy) fall within ± 20 percent would be known (Fig 3). When tolerances are set, FBOs will know if their product will comply or not. What is however unknown is the variability of lab test results of competent authorities. Even here there is "established practice'.

Each State FDA/UT make measurements under different laboratory ecosystems. Recognizing this fact, EU (1)and US FDA (4)provide guidance on how the regulator should deal with compatibility issues.The EU requires its Member States (MS) - comparable to Indian State FDAs - to carry out "official controls" for compliance in accordance with provisions laid down in regulations (2).

Member States, on a yearly basis are required to provide the Commission (comparable to Food Authority in India) with the number of tests performed, food categories tested, the results of which were compared with the values declared and the decision taken, including actions taken where the measured value was outside the tolerance of the declared value (1).Based on experiences gained, the Commission and the MS discuss and agree on future modifications of the guidance document.

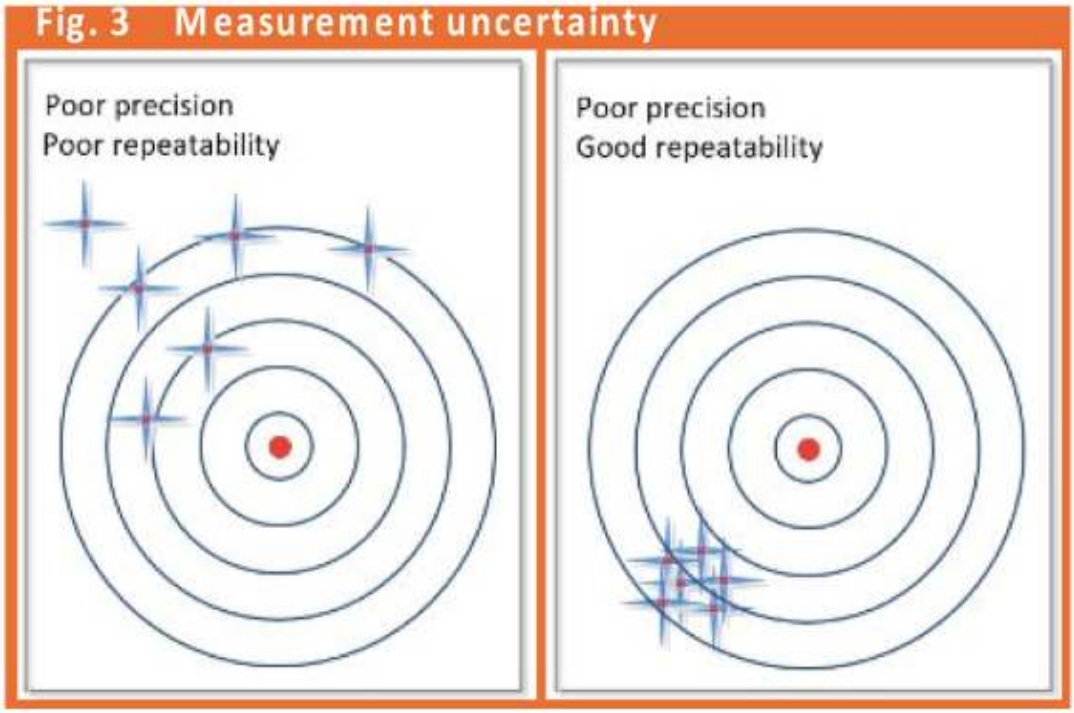
Stakeholders will be consulted accordingly. This is active compliance enablement.

How should compliance enablement work between competent authorities and businesses. US FDA(4) assigns responsibility on the manufacturer for assuring the validity of a labelled nutrient value. The data source used to calculate nutrition label values "is the prerogative" of the manufacturer. FDA recommends that nutrient values are determined by laboratory analysis of each nutrient in the product. Such databases are collections of nutrient data compiled by a manufacturer, organization or representative trade association.

The majority of nutrition labelling data bases submitted by industry to FDA falls into "finished foods" category. Although FDA encourages industry to submit databases for the purpose of nutrition labelling, it is voluntary. The agency "has not and does not intend to prescribe how an individual company is to determine nutrient content for labelling purposes".

It is reasonable to expect that lab tests by the competent authority may yield results falling outside the tolerance range with respect to the declared value. When any product is found to be out of compliance, based on the FBOs willingness to come into compliance, US FDA intends to work with the manufacturer and correct the problem(4).

Similarly, the Canadian Food Inspection Agency (5) works to verify the label values based on industry control systems, which include lab analysis, record keeping systems, management of ingredient data, including changes, substitutions and processing. Manufacturers must therefore ensure the food tested will comply with the true lot average. Compliance to established practice is about anticipating that implementation difficulties will arise and that equitable solutions will also be worked out, together.



Abbreviations:

1. FSS (LD) 2020: Food Safety and Standards (Labelling and Display) Regulations 2020.
2. FSS (HSN) 2016: Food Safety and Standards (Health supplements, nutraceuticals .....)Regulation 2016
3. FSS (AC) 2018: Food Safety and Standards (Advertisement and Claims) Regulation 2018.

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5. Nutrition labelling compliance test: Part 1 CFIA

The guidance is divided into the following sections:
- Rounding guidelines for nutrition labelling;
- Tolerances for vitamins and minerals in supplements;
- Tolerances for controlling the compliance levels of nutrients with levels specified in Regulation (EC) No 1924/2006.

TECHNICAL ASPECTS FOR DESIGNING PLANT PROTEIN-BASED PRODUCTS

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They are majorly embracing plant protein-based meat alternatives.

- Non vegetarian and 'guilty meat eaters

Though the Meat Analogue category products are a vegetarian offering, there is sizable chunk of a strictly vegetarian population who doesn't prefer meaty flavour. To cater this large consumer base there is huge scope of innovative design of plant protein-based products on high protein concept. It should address the need of protein intake of protein deficient population.

Introduction

Plant based protein products is catching up a trend, enabling consumer to select protein source between veg source and Nov Veg. source and equally fulfil the health benefits.

Food processing industry is leveraging this as an opportunity to provide good food and great food experience to their consumers including Vegan.

Plant-based protein products aims to replicate or supersede whole consumer experience of Animal based protein proteins in terms of organoleptic properties, stability, and familiarity in traditional meals. In reality plant-based protein products may not completely replicate the whole muscle experience, but it does provide almost similar organoleptic properties and stability during processing.

Major consumer trends of plant-based meat analogue category products in local market at present are:

- Vegan who doesn't consume any food which are from animal origin
- Flexitarian people who mostly eat a vegetarian diet but occasionally eat meat and fish

Technical aspects of Plant Protein Primers and functional ingredients

Plant Protein

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As a result of various approaches in physical, chemical, and biological processing, plant protein sources will gain further traction through their ability to meet key parameters in industry adoption, such as neutral colour, odour, and taste; high protein content; amino acid diversity; and vast functional uses across commercial applications and processes. In their flour various forms, plant proteins may impart the full range of functional characteristics, including solubility, viscosity, gelling, emulsification, foaming, and dough formation.

More the plant proteins are fractionated towards their purer forms, beany notes in legume-derived protein decrease substantially from their native form. Alongside aroma and flavour, other negatively influenced organoleptic factors like mouthfeel, sand-like particulates can be addressed through Hydration, shearing, and cooking in extruder, which has been also valuable in reducing undesirable aromas and flavours in the creation of plant-based meat.

Starch and Fibre

Application of traditional starches like corn, tapioca, potato etc. highlight mainly viscosity (thickening property) but other starches derived from legumes (such as pea starch) present functionalities, gel strength, stabilization, film formation or unique textural influences like replicating the texture of meat products.

Further, starch contributes a means of reducing and controlling expulsion of free water or brine, a process formally referred to as syneresis, basically contributes to better water holding property alongside texture.

Fibre offers a new means of imparting viscosity, gelation, and stringiness while addressing clean label concerns and yielding nutritional benefits. Further to its influences on texture, fibre's linear structure may be of benefit in the creation of extruded plant-based meat products which may aim for a fibrous composition comparable to that of animal-based meat cuts.

Fat

Plant-based oils are typically liquid or semisolid at ambient temperatures. More heavily saturated plant-based oils, such as cocoa butter, coconut oil, and palm oil, melt closer to ambient temperatures (~25ºC), so they may be partially solid in most climates. Plant-based fats that are solid at room temperature and exhibit a melting temperature gradient are extremely desirable.

Binder

Binders are compounds that hold together other components. Common binders used in plant-based meat include soy protein isolate, methylcellulose, carrageenan, and modified starches. Overall, these binders improve the thickening, gelation, and textural properties of end products.

They are typically amphiphilic molecules that effectively interact with oil and water phases and form semi-solid matrices of oleo gel with high fat-holding capacity that provide a good alternative to solid fats.

Other Ingredients

Colouring agents and flavours (including salt) can be either added during extrusion process or applied in the form of a marinade afterwards. Colouring ingredients used should be heat stable for cooking of the product. Pigments of carotene, annatto extracts, beet juice extract, lycopene are some of the choices to make. Stability of colouring ingredients is ensured by adding ascorbic acid.

The flavour profile of meat substitute is compensated by using different flavouring ingredients including spices, herbs, savoury yeast extract, paprika and sugar. Mushroom concentrate could also be used for flavour enhancement.

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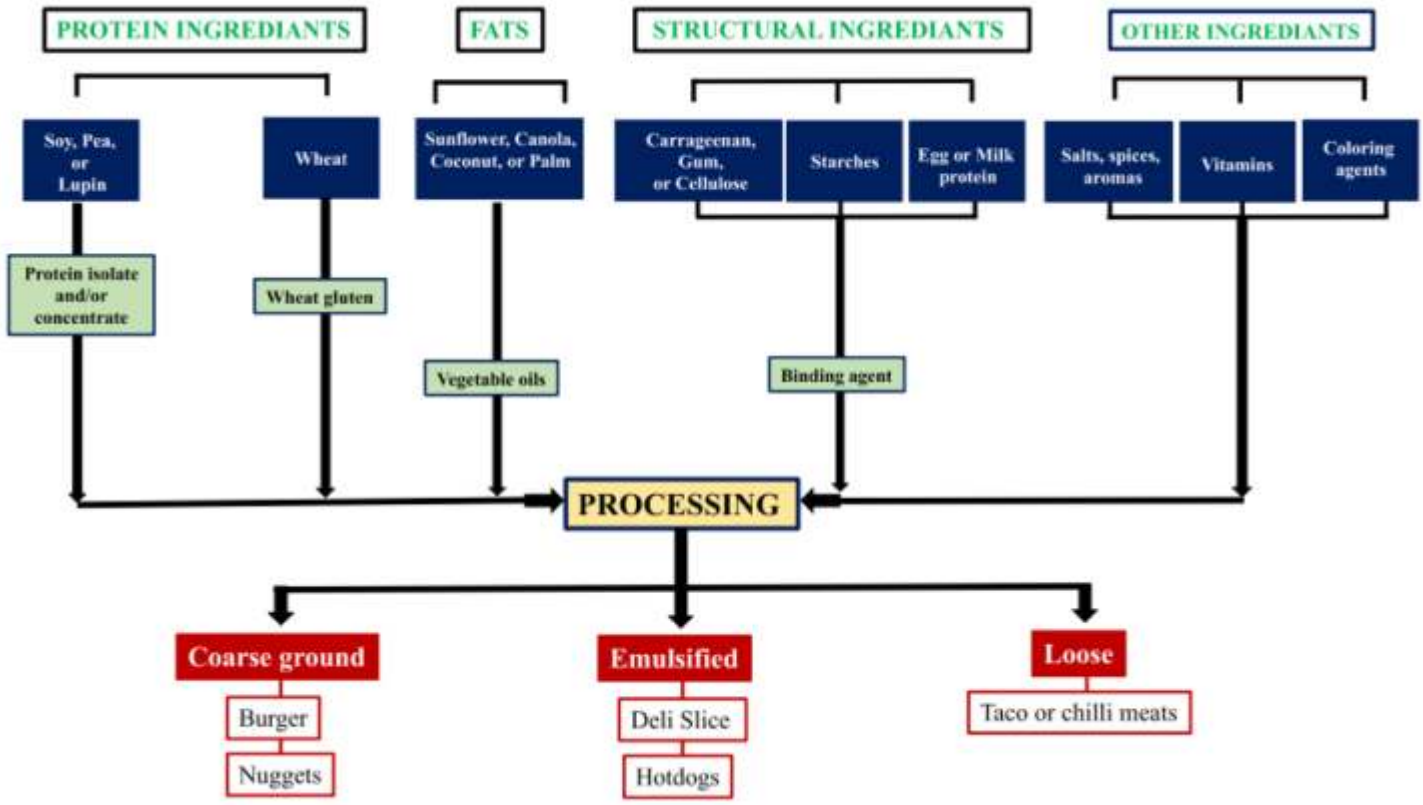

Challenges

Meat and meat products' texture, tenderness, flavour, mouthfeel, and juiciness are greatly contributed by animal fats. Fats are strongly water-repelling, or hydrophobic. Because plant-based formulations tend to be made in aqueous conditions, incorporating fats has been challenging.

An obstacle to making marbled meat has been creating solid fat differentiated from protein and with a melting temperature gradient above room temperature. Proper emulsification and oleo gel formation, can stabilize and modulate the melting temperature.

Plant oils and omega-3s are unsaturated fats that are prone to oxidation, which negates their health benefits and creates off-flavours and unpleasant odours. Stabilization of these fats to prevent oxidation is a crucial need for alternative meat and seafood.
Plant proteins, which often have off-flavours and lack the aroma associated with conventional meat. For example, legume proteins have an unpleasant beany flavour due to lipoxygenase-initiated peroxidation of unsaturated fats. Off-flavours also arise through non-enzymatic browning Maillard reactions.

Mr. Shyamsunder Kundu has an expertise in development of Plant based and Protein based Innovative processed food products.

Mr. Vinay Vasant Hastak is a veteran Food Technologist and has wide experience in Food Processing Industry for Manufacturing , Quality Assurance & Produce Development.

USED COOKING OILS: BANE AND OPPORTUNITY

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Deep fat fried foods are very good to taste. We love French fries, potato chips, or even typical traditional snacks like vadas. However, while making these foods commercially the oils are repeatedly used.

During every heating the oils undergo undesirable changes because of various factors such as moisture content in the foods, atmospheric oxygen, and high temperatures of heating. Oils undergo reactions like hydrolysis, oxidation, and polymerisation. The chemical nature of oil is changed because of release of free fatty acids and free radicals that in turn combine to make monoglycerides, diglycerides, and polymeric tri glycerides. These are termed as “Total Polar compounds” which indicate degradation of oil. These oils have higher viscosity bad colour and flavour.

These polar compounds are not good for health. They are not digestible, may pose risk of heart disease in long term and gastrointestinal disorders in short term. Many studies have indicated bad health effects of these polar compounds. One such study was carried out in which mice were fed with polar compounds treated diet against control fed with normal diet.The serum and hepatic metabolites were analysed from these mice, based on GC-MS and liquid chromatography. Studies indicated alterations in lipid metabolism with increase in phospholipids, fatty acids, cholesterol and decrease in choline, betaine, and L-acetyl carnitine. The TCA cycle and carbohydrate, amino acid and purine metabolism were also affected. To summarise, polar compounds may cause lipid deposition, impaired energy metabolism and oxidative stress resulting in toxicological effects in mammalian health.

Used Cooking oils (UCO) are not only hazardous for health but also create environmental hazards if disposed of without treatment. Untreated UCO when disposed of, chokes the drains because it is very highly viscous and sticky in nature.

Looking into the ill effects of used cooking oils globally regulators have restricted use of reuse of cooking oils putting limits for Total Polar Compounds. In India, FSSAI has taken steps to restrict repeated use of oils and has thought of total solution. First amendment of licensing regulations came in 2017 which limits Total Polar Compounds not more than 25%.

Subsequent order of May 2019 mandated FBOs using more than 50Kg of oils daily to keep records and dispose UCO to only agencies authorised by FSSAI. FSSAI in collaboration with Bio Diesel association of India launched RUCO (Repurpose Used Cooking Oil) project.

This project enables the collection of inedible cooking oils from institutions and users and transfers to plant which convert it into Biodiesel. In order to further streamline RUCO initiative, FSSAI in its latest order of February 23, has developed an application (available on RUCO website). This will facilitate to track whole RUCO system i.e., generate RUCO disposal request, Non-Food Production (NFP) units and recognise aggregators requested by NFP units on real time basis.

Therefore, UCO are problematic, they cannot be used neither can be easily disposed of. Can we convert this problem into opportunity? India's most used fuel is Diesel which is 85% imported.

This import dependence can be reduced if portion of this fossil fuel can be replaced by equally combustible fuel. The UCO generated during processing by small and large manufacturers can be converted into Biodiesel.

Indian Oil Corporation in May 2021 launched a programme in which 7% of Biodiesel generated from UCO can be doped with diesel.

To encourage this initiative, oil companies are offering five years fixed price and ten years guaranteed offtake.India's used cooking oil market in 2022 was 3.2 M tons which is expected to grow to 4.1 m tons by 2028. Therefore, such efforts by oil companies and FSSAI will lead to generate more Biodiesel from UCO. This will help to bring down the import costs fuels by energy efficient Biodiesels.

This value added by product generation will attract manufacturers to sell UCO for this purpose avoiding reuse for food uses which leads to health issues for public.

Biodiesel is superior to fossil fuel in terms of exhaust emissions, flash point, cetane number (combustion quality) and lubricity characteristics. It returns 90% more energy than required to produce it.

When mixed with conventional fuels at proportions, do not need modification of engine. It is low cost and leads to less greenhouse gas emissions. This can be produced by trans esterification methods in which used oils are reacted with alcohols in presence of catalysts like alkali, enzymes etc.

This bane of Used Cooking Oils reuse or disposal can be converted into opportunity. A lot needs to be done to create awareness and more coordination between manufacturers using oil and the convertors into Biodiesel.

Finamul 4087L: Functional Emulsifier System for Cookies

FINE ORGANICS

Cookies are the most sought-after snack in India. However due to its higher fat content (+20%) consumer trend is more toward low fat options. Hence, manufacturers are finding ways to reduce the fat content without affecting textural & sensorial attributes.

Fine Organic's functional emulsifier system Finamul 4087L enables manufacturers to reduce fat by 7-10% in cookies.

Control	T1	T2

Excellent texture, richness and mouth-feel at lower fat content have been observed while using Finamul 4087L

Parameters	Control	T1	T2
Fat (%)	100	100	**90**
Emulsifier		Lecithin (322)	**Finamul 4087L**
Cream density	0.618	0.569	**0.557**
Avg. height of 10 biscuits (cm)	8.4	9.4	**9.5**
Avg. Weight of 10 biscuits (g)	111.2	111.5	**114**
Avg. Diameter (cm)	5.6	5.5	**5.5**
Spread ratio	0.66	0.56	**0.58**
Bite	Slight hard	slight crispy/soft	**Soft/crispy**

10% lower fat with excellent textural properties

Advantages of Finamul 4087L :

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AI-POWERED PERSONALIZED RECOMMENDATIONS IN FOOD AND BEVERAGE INDUSTRY

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In recent years, artificial intelligence (AI) has made significant strides in helping businesses of all kinds to enhance their marketing efforts. One industry that stands to benefit greatly from AI is the food and beverage industry. The food and beverage industry is a highly competitive one, with numerous brands struggling for consumers' attention. In such an environment, companies are always looking for innovative ways to develop successful marketing strategies and attract more customers. One technology that has the potential to revolutionize food and beverage marketing is artificial intelligence (AI). With AI, food and beverage marketers can understand consumer preferences better, develop personalized marketing campaigns, optimize pricing and promotions, and even improve product development.

There are several AI technologies that are used for marketing food and beverage products, out of all those, personalized recommendation has played a vital role. Personalized recommendations using AI technology have revolutionized the food and beverage industry by enhancing the customer experience and increasing sales. With the growing number of customers and products in the market, personalized recommendations can help customers find products they like and help businesses upsell and cross-sell products.

Artificial intelligence techniques are used by AI-based recommendation engines to analyse a large number of data and then make personalized recommendations. These systems are actually designed to help users find relevant and valuable content or products based on their preferences, behaviour, and history.

How does it work?

A recommendation engine uses machine learning algorithms to generate recommendations by analysing the user data. The algorithms identify the pattern such as browsing history, preferences, etc. These patterns are then used to predict what the users might be interested in and accordingly make personalised recommendations.

This article will explore how personalized recommendations use AI technology in the marketing of food and beverage products.

Understanding Personalized Recommendations

Personalized recommendations are a type of artificial intelligence technology that uses data analysis to predict what a customer might like based on their preferences, behaviour, and past purchases. It becomes easier for customers to find products they are likely to enjoy with the help of machine learning algorithms, as personalized recommendations can be highly accurate and efficient.

How are Personalized Recommendations Used in the Marketing of Food and Beverage Products?

Personalized recommendations are used in the marketing of food and beverage products in several ways. Below are some of the ways in which businesses use personalized recommendations, which help the companies to grow:

A. Suggesting Complimentary Products

Businesses can use personalized recommendations to suggest complementary products based on the customer's purchase history. For example, if a customer purchases a bottle of wine, the system can suggest cheeses that pair well with the wine. This helps businesses to cross-sell products, thereby increasing sales and revenue.

B. Promoting New Products

Personalized recommendations can be used to promote new products to customers based on their purchase history and preferences. For instance, if a customer regularly purchases vegetarian products, the system can suggest new veg products recently added to the store. This helps businesses to upsell products, thereby increasing sales and revenue.

C. Offering Discounts and Promotions

Businesses can use personalized recommendations to offer discounts and promotions to customers based on their behaviour and preferences. For example, if a customer has a history of purchasing organic products, the system can offer a discount on organic products or suggest new organic products that have recently been added to the store. This helps businesses to retain customers and increase customer loyalty.

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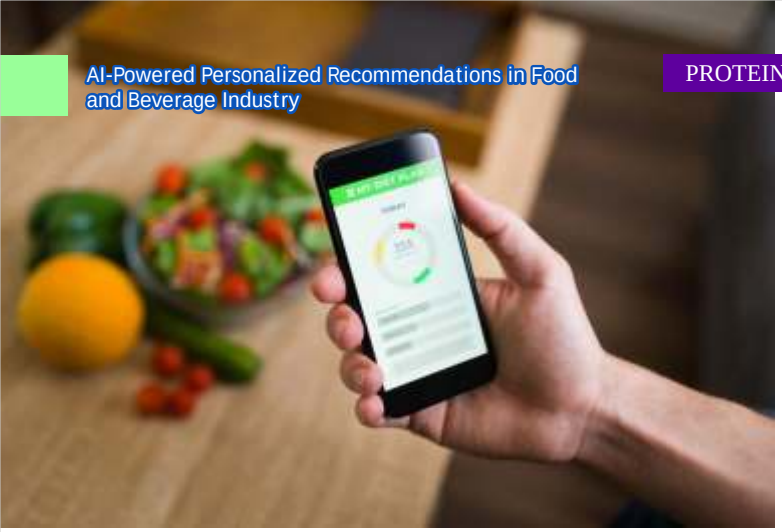

D. Personalized Recommendations on Restaurant Menus

Restaurants can use personalized recommendations on their menus to suggest food and beverage items to customers based on their preferences and dietary restrictions. For instance, the system can suggest gluten-free dishes, if a customer is allergic to gluten. This helps the restaurants to get positive feedback from their customers as they get satisfied and become happy with such services.

E. Customizing Food and Beverage Products

Personalized recommendations can be used to customize food and beverage products as per the customer's preferences. For example, if a customer orders a coffee, the system can suggest customizations such as the type of milk, the amount of sugar, and the type of flavour. This again helps businesses as it increases customer satisfaction.

Benefits of Personalized Recommendations in the Marketing of Food and Beverage Products

The benefits of using personalized recommendations as AI technology in the marketing of food and beverage products include:

Enhanced Customer Experience

Personalized recommendations help businesses to provide a better customer experience by suggesting products that customers are likely to enjoy based on their preferences and behaviour.

Increased Sales and Revenue

Personalized recommendations help businesses to increase sales and revenue by cross-selling and upselling products, offering discounts and promotions, and promoting new products.

Improved Customer Retention

Personalized recommendations help businesses to retain customers by offering personalized discounts and promotions, customizing products, and suggesting complementary products.

Better Inventory Management

Personalized recommendations help businesses to manage their inventory better by identifying the products that are popular among customers and those that are not. This helps businesses to stock products that are likely to sell, thereby reducing wastage and increasing profitability.

As the use of AI is booming, we can see a lot of things going around in the food & beverage industry already. The F&B companies are trying to increase sales by utilising the power of AI to suggest personalised recommendations. The use of AI-powered marketing is turning out to be a gem for F&B companies to deliver personalised experiences & also increase sales.

Conclusion

Personalized recommendations using AI technology have revolutionized the food and beverage industry. Businesses can use personalized recommendations to suggest complementary products and promote new products, offer discounts and promotions, customize food and beverage products, and personalize restaurant menus. By doing so, the businesses provide customer satisfaction, loyalty & retention, and ultimately generate more revenue.

Moreover, personalized recommendations can also help businesses to better understand their customers' preferences and behaviour. With the help of data analytics, businesses can identify patterns and trends in customers' purchase history and preferences and use this information to make better business decisions. For example, businesses can use this data to optimize their inventory, pricing, and marketing strategies, and to develop new products that cater to their customers' needs.

As this technology continues to evolve, it is likely that personalized recommendations will become even more sophisticated and accurate, further transforming the food and beverage industry.

With this, companies should also be mindful of potential privacy concerns when using personalized recommendations. Customers may be hesitant to share their personal information and purchase history, especially if they feel that their privacy is not being respected. To address these concerns, companies must be transparent about how they collect, use, and protect customer data, and give customers the option to opt out of personalized recommendations if they choose to do so.

Another challenge is the need for specialized skills and expertise. AI sounds very easy to go but it is a very complex and also rapidly evolving field, it cannot be performed randomly without any knowledge. It requires specialized knowledge and skills to effectively use AI tools and algorithms. Many food and beverage companies may not have the internal expertise necessary to use AI in their marketing efforts because of this they fail to improve or lack in any way.

In conclusion, AI has the potential to revolutionize food and beverage marketing by enabling companies to analyse large amounts of data and create personalised recommendations. As AI continues to advance, we can expect to see even more innovative uses of this technology in the food and beverage industry. AI is not a silver bullet, while it can provide valuable insights and help companies grow, it cannot replace human judgment and creativity. Marketers must still use their own insights and expertise. By staying up to date on the latest trends and developments in AI, food and beverage marketers can continue to drive growth and profitability for their businesses while also providing consumers with the products and experiences they desire.

REGULATORY ROUND UP

AUTHOR
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Dear Readers,

Following are notifications /orders after last Round Up.

Draft Notification of Food Safety and Standards (Prohibition and Restrictions on Sales) Amendment Regulations, 2023 [Uploaded on 28-04-2023] The draft regulations proposes to do away with the mandatory requirement of AGMARK certification in case of Multi Source Oils and Ghee and BIS certification requirement in Skimmed Milk Powder, Infant Formula, Follow Up Formula, Packaged Drinking Water and Packaged Mineral Water, etc.

All these products, once finally notified, will be completely under the aegis of FSSAI. This move should be welcomed as it is in line with the objectives of Food Safety and Standards Act (2006) to do away with the multiplicity of food laws. This would enhance the “Ease of doing Business”.

Direction under Section 16(5) of Food Safety and Standards Act, 2006 regarding operationalization of MRL of Pesticides used in Tea: This direction dated 27th April 2023 operationalizes the draft (dated 20.08.2023) which set limit for five pesticides in Tea. The operationalization is with immediate effect.

[Re-operationalization of the Standards of Crude Corn (Maize) Oil](#) : This amendment is already notified on FSSAI website on 31.05.2022 for public comments. In order to allow FBOs to import crude corn oil, the draft amendment is re operationalised from 20.12.2022.

[standards of Fortified Rice Kernel](#): The draft notifications were operationalised on 23.06.23. As the final notification is taking time, the provisions for fortification are re-operationalised.

However, provisions with respect to Yeast and Mould count and Aerobic Plate Count parameter of Rice flour for preparation of Fortified Rice Kernel, stand withdrawn with the issue of this direction.

[Re-operationalisation of Draft Food Safety and Standards (Food Products Standards and Food Additives) Amendment Regulations with respect to the](#)

[Re-operationalisation of FSS (Health Supplements, Nutraceuticals, Food for Special Dietary Use, Food for Special Medical Purpose and Prebiotic and Probiotic Food) Regulations, 2022](#).As the readers are aware, FSS (Nutra) Regulation, 2022 was operationalized with effect from 29.03.2022. Subsequently, through a directive dated 10.05.2022, additional additives were permitted. FSSAI has decided to re-operationalize these two directives till such time the final notification is made. This means, FBOs may continue use these two directives presently.

RESEARCH IN HEALTH & NUTRITION

Sugar is processed differently in the brains of obesity-prone vs. obesity-resistant rats

Science Daily February 2, 2023

A new study tracked what happens in the brains of rats in real time in the brain when presented with glucose, a type of sugar, labelled with a tracer. The tracer allowed the researchers to measure this new sugar in the brain.

On a diet? Perhaps you're avoiding sweets or carbs altogether or curbing late-night munchies. These are examples of behaviour modifications and when it comes to food, avoiding those diet triggers can be pretty hard to do.

To understand what drives people to overeat, scientists are looking more closely at a brain structure involved in motivation, called the nucleus accumbens. This small region drives reward-seeking behaviours underlying the pursuit of sex, recreational drugs like nicotine and alcohol, and food. "These brain motivation centres evolved to help us survive; finding food and having sex are essential to the survival of an individual and of a species," said Carrie Ferrario, Ph.D., associate professor in the Department of Pharmacology at U-M Medical School.

"What was advantageous when food was hard to find has become a disadvantage and unhealthy in the current food dense environment. This is compounded by the over-abundance of over-processed, low nutrition foods that may satisfy our taste but leave our bodies unnourished. People don't tend to find it difficult to turn down an extra serving of broccoli, but just one more french-fry or making room for a bit of chocolate dessert...that's a different story. The real challenge is overcoming these urges and changing our behaviour when it comes to food," Ferrario added.

Previous research from Ferrario's lab pinpointed differences in the nucleus accumbens in obesity-prone and obesity-resistant rats. Their latest study, published in the *Journal of Neurochemistry*, tracked what was happening in real time in the brain when these animals were presented with glucose, a type of sugar, labelled with a tracer. The tracer allowed the researchers to measure this new sugar in the brain.

Sugar is the brain's main fuel source and once there, the molecule is broken down and used to create new molecules such as glutamine, glutamate, and GABA, each with an important role in influencing the activation of neurons in the brain and nervous system. They found that glucose was taking longer to get into the nucleus accumbens of obesity-prone animals.

Furthermore, when measuring the concentration of the glutamate, glutamine, and GABA, they discovered excess levels of glutamate, an excitatory neurotransmitter. This, said the team, implied a defect in a neurotransmitter recycling process, typically maintained in the nervous system by star-shaped cells called astrocytes.

Ferrario added, "The balance between glutamate and GABA (the main inhibitory transmitter) is really important for brain function and will influence activity of the neurons in the nucleus accumbens." This balance, and therefore brain activity, is different in obesity-prone vs. obesity-resistant rats.

The fact that these rats are either prone to obesity or not is important for disentangling cause and effect, says Vollbrecht. "It allows us to remove diet as one of the variables."

Fructose Could Drive Alzheimer's Disease

Science Daily February 13, 2023

An ancient human foraging instinct, fuelled by fructose production in the brain, may hold clues to the development and possible treatment of Alzheimer's disease (AD), according to researchers at the University of Colorado Anschutz Medical Campus.

The study, published recently in The American Journal of Clinical Nutrition, offers a new way of looking at a fatal disease characterized by abnormal accumulations of proteins in the brain that slowly erode memory and cognition. "We make the case that Alzheimer's disease is driven by diet," said the study's lead author Richard Johnson, MD, professor at the University of Colorado School of Medicine specializing in renal disease and hypertension. Johnson and his team suggest that AD is a harmful adaptation of an evolutionary survival pathway used in animals and our distant ancestors during times of scarcity.

"A basic tenet of life is to assure enough food, water and oxygen for survival," the study said. "Much attention has focused on the acute survival responses to hypoxia and starvation. However, nature has developed a clever way to protect animals before the crisis actually occurs."

When threatened with the possibility of starvation, early humans developed a survival response which sent them foraging for food. Yet foraging is only effective if metabolism is inhibited in various parts of the brain. Foraging requires focus, rapid assessment, impulsivity, exploratory behaviour and risk taking. It is enhanced by blocking whatever gets in the way, like recent memories and attention to time. Fructose, a kind of sugar, helps damp down these centres, allowing more focus on food gathering.

In fact, the researchers found the entire foraging response was set in motion by the metabolism of fructose whether it was eaten or produced in the body. Metabolizing fructose and its by-product, intracellular uric acid, was critical to the survival of both humans and animals.

The researchers noted that fructose reduces blood flow to the brain's cerebral cortex involved in self-control, as well as the hippocampus and thalamus. Meanwhile, blood flow increased around the visual cortex associated with food reward. All of this stimulated the foraging response. Fructose produced in the brain can lead to inflammation and ultimately Alzheimer's disease, the study said. Animals given fructose show memory lapses, a loss in the ability to navigate a maze and inflammation of the neurons.

Taking Vitamin D Could Help Prevent Dementia

Science Daily
March 1, 2023

Taking vitamin D supplements may help ward off dementia, according to a new, large-scale study. Researchers explored the relationship between vitamin D supplementation and dementia in more than 12,388 participants of the US National Alzheimer's Coordinating Center, who had a mean age of 71 and were dementia-free when they signed up. Of the group, 37 per cent (4,637) took vitamin D supplements.

In the study, published in Alzheimer's & Dementia: Diagnosis, Assessment & Disease Monitoring, the team found that taking vitamin D was associated with living dementia-free for longer, and they also found 40 per cent fewer dementia diagnoses in the group who took supplements.

Across the entire sample, 2,696 participants progressed to dementia over ten years; amongst them, 2,017 (75%) had no exposure to vitamin D throughout all visits prior to dementia diagnosis, and 679 (25%) had baseline exposure. Professor Zahinoor Ismail, of the University of Calgary and University of Exeter, who led the research, said: "We know that vitamin D has some effects in the brain that could have implications for reducing dementia, however so far, research has yielded conflicting results. Our findings give key insights into groups who might be specifically targeted for vitamin D supplementation. Overall, we found evidence to suggest that earlier supplementation might be particularly beneficial, before the onset of cognitive decline."

While Vitamin D was effective in all groups, the team found that effects were significantly greater in females, compared to males. Similarly, effects were greater in people with normal cognition, compared to those who reported signs of mild cognitive impairment -- changes to cognition which have been linked to a higher risk of dementia.

The effects of vitamin D were also significantly greater in people who did not carry the APOEe4 gene, known to present a higher risk for Alzheimer's dementia, compared to non-carriers. The authors suggest that people who carry the APOEe4 gene absorb vitamin D better from their intestine, which might reduce the vitamin D supplementation effect. However, no blood levels were drawn to test this hypothesis.

"Food Order" The Next Frontier of Medical Nutrition to Treat Diabetes, Research Demonstrates

27 Feb 2023 Nutrition Insight

Researchers have found that the order of eating vegetables, protein or fat – along with eating them slowly – can improve postprandial blood glucose trajectory and decrease insulin secretion in people with or without Type 2 diabetes mellitus (T2DM).

The team of Japanese researchers recruited 18 healthy women from Kyoto Women's University in Japan for an interventional study to test their hypothesis, with results showing that the speed and order with which vegetables, protein and fat are consumed can significantly impact postprandial blood glucose and the development of T2DM.

Globally, 537 million people are estimated to have diabetes and the number is predicted to increase to 783 million by 2045, with 90% of them estimated to be T2DM. Diabetes is the gateway to many other disorders and conditions, including renal failure, new onset blindness and lower-extremity amputation in the US.

While people's diets have been pivotal in managing and preventing T2DM, several difficulties remain, including one being more effective than another at weight loss, people changing their diets and others stopping dieting altogether.

The study published in Nutrients sought to explore whether fast eating habits lead to an increased risk of diabetes and obesity. A within-participants cross-over design was conducted in which identical meals were consumed at three different eating speeds.

The test meal (tomato, broccoli, fried fish and boiled white rice) for this study was consumed by 18 young, healthy women to assess the influence on postprandial blood glucose, insulin, triglyceride and free fatty acid levels.

The breakfast meal consisted of 671 kcal and was consumed at a fast speed (10 minutes), slow speed (20 minutes) with vegetables first and slow speed (20 minutes) with carbohydrates first for three consecutive days.

There was no significant difference between fast and slow eating on postprandial blood glucose and insulin levels as long as vegetables were consumed first. However, postprandial blood glucose at 30 minutes was significantly lower in slow eating with vegetables first than that of fast eating with the same food order.

The results suggest that food ordered with vegetables first and carbohydrates last improves postprandial blood glucose and insulin concentrations even if the meal was consumed faster.

Overall, the study shows that adjusting the order at which foods are consumed can be an "efficient and cost-effective" way to promote weight management in obese and healthy individuals to prevent T2DM.

Various other evidence-based studies have suggested that a diet rich in vegetables and low GI grains is the substantial dietary pattern predicting low risk of T2DM, obesity and cardiovascular diseases.

Thus far, research has shown that the most effective diets include the Mediterranean diet, a low-calorie diet, a low-carbohydrate, low-glycemic-index diet, a vegetarian diet and an intermittent fasting diet.

In Japan, "food order" is widely recognized as an innovative medical nutrition therapy for individuals with T2DM and significantly affects acute and chronic glycemic control.

By Inga de Jong

Unlocking Kombucha's Health Benefits: Fermented Beverage Can Lower Blood Sugar Spikes, Study Reveals

21 Feb 2023 Nutrition Insight

Researchers found that kombucha reduced the glycemic index (GI) and insulin index (II) when consumed with a high-GI meal, while sugar-free soda water and diet lemonade did not.

Lowering blood glucose levels could reduce the risk of diseases such as insulin resistance and diabetes. When consuming kombucha, the GI value lowered to 68 and II to 70. GI values after the same meal with soda water or diet lemonade amounted to 86 and 84, respectively. These GI values were similar to the consumption of the meal without an accompanying beverage.

Professor Jennie Brand-Miller, one of the study's authors, notes that nutritionists rarely have something good to say about soft drinks. "But now there's an exception – we have shown a specific live form of kombucha reduces the blood glucose response to a meal." She adds that kombucha "provides an alternative to alcoholic and non-alcoholic beverages and is a simple and enjoyable way to improve health." According to the study, published in Frontiers in Nutrition and conducted at Sydney University's Glycemic Index Research Service in Australia, high glycemic diets induce high and recurrent surges in blood glucose and insulin levels. Long-term consumption of such meals could lead to multiple health issues, such as the risk of insulin resistance, development of cardiovascular disease, dyslipidemia, diabetes and certain cancers.

The researchers point to data that low-GI diets could reduce the risk of such diseases, improve blood glucose control and insulin sensitivity in people with diabetes, can be used for weight control and reduce high blood fat levels. Professor Marc Cohen from the Extreme Wellness Institute Melbourne, Australia, says that the health effects of kombucha have been extensively studied in animals. In these studies, "kombucha has been shown to assist in detoxification, digestion, antioxidation, energy metabolism and immunity." He adds, "this is the first controlled clinical trial of kombucha in humans and the first study to show living kombucha reduces postprandial blood sugar spikes when consumed with a meal." Kombucha is also marketed for its gut health support, as the fermented drink contains prebiotics, probiotics and post-biotics.

Kombucha popularity

According to Cohen, "Kombucha originated in ancient China where it was labelled the 'Elixir of Life' and 'The Tea of Immortality' after it was discovered fermented tea produces a delicious, fizzy and tart drink that makes the drinker feel wonderful. Kombucha is the world's fastest growing functional beverage with a global market of over US$500 million in 2022, so, surprisingly, it's taken so long to see a published clinical trial of kombucha in humans.

The researchers conducted a clinical trial with 11 healthy adults to examine the GI and II after a high-GI meal consisting of Jasmine rice, soy sauce and green peas. The test participants consumed three reference glucose solutions and three test meals with different beverages. With each test meal, the participants consumed either an unpasteurized kombucha, a diet lemonade soft drink or a soda water.

The GI or II values were calculated by expressing the two-hour blood glucose and insulin response as a percentage of the reaction produced by the reference glucose solution, consisting of 50g of glucose dissolved in water. While the soda water and lemonade did not contain sugar, kombucha added 1.7g of sugar to the test meal.

Cohen adds, "the mechanisms of kombucha's action on blood sugar are unclear and not all kombuchas are the same." The researchers speculate that multiple mechanisms account for the observed effect of kombucha on GI and II values. They point to the complex mix of chemical constituents, live microorganisms' actions, and kombucha's low pH. Moreover, they state that further studies are needed to examine the mechanisms of kombucha and its potential therapeutic benefits.

By Jolanda van Hal

Tech Solutions Mimicking Human Organs in the Future of Prebiotics and Gut Health

23 Feb 2023 Nutrition Insight

The consumer interest in gut health will remain steady, according to the nutrition industry. Experts talk us through technological innovations and forecast personalized prebiotics becoming a major trend in the near future. NutritionInsight speaks with experts from Gnosis by Lesaffre, Sensus, FrieslandCampina Ingredients, ADM and Univar Solutions about the latest development for prebiotics and how technology taps into the sphere.

"Several in-vitro technologies are used to mimic the physiology of human organs, such as gastrointestinal tract compartments. There are numerous possibilities of in-vitro models to characterize the effect of prebiotics and the choice mainly depends on the expected outcomes," says Clarisse Geraci, product manager at Gnosis by Lesaffre. "A dynamic model can be used to evaluate the prebiotic's impact on the modulation of the microbial communities, the metabolic activities or the inflammatory processes over time," she exemplifies.

Microbiome sequencing

Sophie Zillinger Molenaar, global marketing lead for Biotis, FrieslandCampina Ingredients, says that "as more consumers become interested in the benefits of good gut health, there's no doubt that technological advances will help us unlock many as yet unknown benefits of our microbiota."

Scientists are trying to decode the genetic material of our microbiome by using a complex process called microbiome sequencing. She adds that by using a complex process called microbiome sequencing, scientists are trying to uncover and decode the genetic material of our microbiome. "Research has already highlighted how diverse everyone's gut microbiome is and scientists are now looking at how influencing the gut microbiota could help improve health and patient outcomes. With this technology – as well as others in development – there's no telling how much we will soon be able to know about the microbiome, how it can support overall health and what we can do to influence our gut health," Molenaar adds.

"Further, these technologies avoid using animal models and give consistent information to prepare experimental strategies for clinical trials. Technology becomes integral at the preliminary investigation stage as a pre-clinical step," Geraci comments. "Technology will never perfectly replicate the human organism, but constant progress offers the opportunity to compile preliminary evidence of the beneficial effects of prebiotics on health," she adds.

Silvi Siddhu, senior global marketing and technical sales manager for Nutraceuticals at Univar Solutions, says that technology has long played an essential role in developing novel food bioactives and that prebiotics are no exception. Siddhu says there are several methods for producing well-known prebiotics and for producers to adapt various technologies, such as fermentation technology or ultrasound technology, to develop proprietary methods for their prebiotics are common. "As we continue to explore different sources and their mechanisms, technology will remain at the forefront of optimizing production methods," she adds.

Trending in prebiotics

Jolanda Vermulst, manager of market intelligence at Sensus, tells us that prebiotics, such as chicory inulin, are attractive because they deliver a "feel the benefit" effect, as it is related to digestive wellness while having strong consumer-connected benefits such as their ability to replace or reduce sugar while adding fibre.

Siddhu adds that prebiotic sources are no longer limited to non-digestible carbohydrates as other potential sources are being discovered. "Prebiotic applications continue to expand in the food and beverage, dietary supplement, pet food and animal feed sectors. Synbiotics are also gaining popularity as consumer awareness of the gut microbiome increases and its impact on overall health expands," says Siddhu.

Molenaar adds that the uprising trend in 2022 on holistic well-being is still going strong. "We're in an era defined by climate change, conflict and COVID-19, so it may be no surprise that consumers are turning their focus inwards, prioritizing their gut health and mental well-being. This year we're likely to see more and more consumers turning to gut health solutions that offer added benefits, such as stress and anxiety reduction and general mood support," Molenaar asserts.

Geraci details that prebiotics were mainly considered as "fibres" with no clear understanding of how they interact with the microbiome, except that they are beneficial for digestion. She further details that people seek prebiotic and probiotic combinations, a specific activity or action on gut microbiota or certain prebiotic ingredients. "There's also a choice related to health benefits – immunity as well as brain and bone health, for example, are uncovering newfound benefits in the scope of prebiotics," says Geraci.

By Beatrice Wihlander

"Food Order" The Next Frontier of Medical Nutrition to Treat Diabetes, Research Demonstrates

27 Feb 2023 Nutrition Insight

Researchers have found that the order of eating vegetables, protein or fat – along with eating them slowly – can improve postprandial blood glucose trajectory and decrease insulin secretion in people with or without Type 2 diabetes mellitus (T2DM).

The team of Japanese researchers recruited 18 healthy women from Kyoto Women's University in Japan for an interventional study to test their hypothesis, with results showing that the speed and order with which vegetables, protein and fat are consumed can significantly impact postprandial blood glucose and the development of T2DM.

Globally, 537 million people are estimated to have diabetes and the number is predicted to increase to 783 million by 2045, with 90% of them estimated to be T2DM. Diabetes is the gateway to many other disorders and conditions, including renal failure, new onset blindness and lower-extremity amputation in the US.

Food order matters

While people's diets have been pivotal in managing and preventing T2DM, several difficulties remain, including one being more effective than another at weight loss, people changing their diets and others stopping dieting altogether.

The study published in Nutrients sought to explore whether fast eating habits lead to an increased risk of diabetes and obesity. A within-participants cross-over design was conducted in which identical meals were consumed at three different eating speeds.

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Eating patterns under the microscope

Various other evidence-based studies have suggested that a diet rich in vegetables and low GI grains is the substantial dietary pattern predicting low risk of T2DM, obesity and cardiovascular diseases. Thus far, research has shown that the most effective diets include the Mediterranean diet, a low-calorie diet, a low-carbohydrate, low-glycemic-index diet, a vegetarian diet and an intermittent fasting diet.

In Japan, "food order" is widely recognized as an innovative medical nutrition therapy for individuals with T2DM and significantly affects acute and chronic glycemic control. The average amount of vegetables consumed in Japan is less than the 350 g recommended by the Ministry of Health, Labor and Welfare. About 70% of US citizens do not eat the amount of vegetables recommended by the US Department of Agriculture and 25% do not eat vegetables at all. Economic shortcomings, lack of knowledge and access to fresh produce are a few reasons cited for the low consumption of fresh vegetables and food.

According to the researchers writing in nutrients, the food order and eating speed in the present study are easier to maintain in real life than other methods of medical nutrition therapy for T2DM. The specific role types of diets have in maintaining overall bodily health continue to be a key focus for nutritionists. Another recent study from the German Diabetes Center in Düsseldorf revealed a strong association between the addition of whole grains, fibre, fish and n-3 polyunsaturated fatty acids as having the potential to reduce all premature death risk factors in adults with T2DM.

Elsewhere, researchers have demonstrated that adults with prediabetes who take vitamin D supplements are 15% less likely to develop diabetes, according to a recent review of three clinical trials published in the Annals of Internal Medicine.

By Inga de Jong

Beneficial Bacteria in the Infant Gut Uses Nitrogen from Breast Milk to Support Baby's Health

Gut Microbes
10.1080/19490976.2023.2192546

A University of Massachusetts Amherst nutrition scientist who has spent his career studying breast milk has demonstrated how beneficial microbes in the gut of infants use nitrogen from human milk to support pediatric nutrition and development.

"The molecules in breast milk not only feed the baby but also feed the baby's microbiome," says David Sela, associate professor of food science and director of the Fergus M. Clydesdale Center for Foods for Health and Wellness. "This changed the way people think about the role of human milk in infant nutrition."

Microbes that feed on breast milk play key roles in an infant's growth, from jump-starting the immune and digestive systems to aiding in brain development. The molecular underpinnings of these processes, however, are not well understood. More than a decade ago, Sela and his team noticed that Bifidobacterium infantis, a beneficial bacterium that colonizes the infant gut, had the ability to degrade urea, a molecule that mammals excrete as waste in urine.

"There's a lot of urea in breast milk and since it's typically excreted out of the system, and this major colonizer has the ability to degrade it, we thought it's possible that the microbes are utilizing this waste product as a nitrogen source within the infant gut," Sela says.

In a paper published Monday, March 27, in the journal Gut Microbes, senior author Sela describes how B. Infantis utilizes urea from human milk to recycle nitrogen in the infant's gut microbiome. The paper lays the groundwork for applying this discovery to improve infant health around the world by identifying molecular targets to improve nitrogen metabolism efficiency.

"This might lead to nutritional interventions and diagnostic tools to address infant nutrition, not only in the Western world, but also in developing countries," Sela says. "If we have a better understanding of how the microbiome contributes to nutrition, we have a better understanding of how to provide nourishment to not only healthy infants but also infants who are preterm or are more predisposed to diseases, sickness and conditions that are deleterious to their health."

To test their hypothesis, researchers in the Sela lab, including lead author Xiaomeng You, a graduate research assistant, demonstrated that the B. infantis bacteria, when fed urea, were able to use it as a nitrogen source. They then tracked the urea nitrogen with a stable isotope. "It gets incorporated into all kinds of bacterial products that the bacteria makes, and that was really insightful," Sela says. "It gives us the strongest evidence that the bacteria is utilizing urea nitrogen for its basic metabolism."

Eating Peanuts Could Have a Beneficial Impact on Vascular Health in Young and Healthy People

EurekAlert 27-Mar-2023

Eating peanuts and peanut butter could have a beneficial impact on vascular health in young and healthy people, according to a study published in the journal Antioxidants. The paper is led by Rosa M. Lamuela, professor at the Faculty of Pharmacy and Food Sciences of the University of Barcelona.

Peanuts, which are obtained from the leguminous plant Arachis hypogaea, are considered nuts in terms of nutritional composition and are the most widely consumed nuts worldwide. High in fatty acids, protein, fibre and polyphenols, they represent a convenient, accessible and nutrient-rich snack that contributes to a healthy lifestyle.

Peanuts, polyphenols and vascular health

Most nutritional studies focus on analyzing significant differences in people with a high risk of suffering from a disease, especially older people. In this population profile, it is easier to observe a beneficial effect if the dietary pattern is altered or a healthy food is introduced into their regular diet.

This study included the participation of 63 healthy young people —aged between 18 and 33— who included a daily portion of peanut products in their regular diet for a period of six months. “In this study group, it is more difficult to see any effect of dietary changes on health”, says Professor Rosa M. Lamuela, from the UB Department of Nutrition, Food Science and Gastronomy.

This study is the first nutritional intervention to confirm an improvement in vascular markers related to the antithrombotic and vasodilator effects in healthy young people after eating peanuts. "The results reveal a significant increase in urinary levels of phenolic metabolites in those young people who had eaten a daily dose of peanuts and peanut butter compared to the control group, which had eaten a cream without fibre or polyphenols", says Rosa M. Lamuela.

"Similarly, participants who ate peanuts or peanut butter also showed improved levels of prostacyclin I2 and the ratio between thromboxane A2 and prostacyclin I2, lipid molecules (eicosanoids) which are considered markers of vascular health”, the researcher notes.

"Interestingly, some phenolic metabolites that increased significantly after the consumption of peanut products —especially hydroxycinnamic acids— also correlated with the improvement in both markers", says researcher Isabella Parilli-Moser (INSA-UB-CIBERobn), first author of the article.

The new study reinforces the hypothesis defended in the scientific literature and in previous studies by this research group on the protective effect of polyphenols —the main antioxidants and anti-inflammatory compounds in the diet— on cardiovascular diseases in adults, as well as their antithrombotic and vasodilator effects. Also, the consumption of nuts and peanuts has been linked to a lower risk of developing cardiovascular diseases and diabetes, especially due to the protective effect of the polyphenols found in these foods.

The article highlights one of the potential health benefits of including peanuts and peanut butter in our diet, "but we need more studies to fully understand the mechanisms that explain the positive effects of peanut consumption on vascular health", the researchers conclude.

Sweets Change Our Brain

EurekAlert 22-MAR-2023

Chocolate bars, crisps and fries - why can't we just ignore them in the supermarket?

Researchers at the Max Planck Institute for Metabolism Research in Cologne, in collaboration with Yale University, have now shown that foods with a high fat and sugar content change our brain: If we regularly eat even small amounts of them, the brain learns to consume precisely these foods in the future.

Why do we like unhealthy and fattening foods so much? How does this preference develop in the brain? "Our tendency to eat high-fat and high-sugar foods, the so-called Western diet, could be innate or develop as a result of being overweight. But we think that the brain learns this preference," explains Sharmili Edwin Thanarajah, lead author of the study.

To test this hypothesis, the researchers gave one group of volunteers a small pudding containing a lot of fat and sugar per day for eight weeks in addition to their normal diet. The other group received a pudding that contained the same number of calories but less fat. The volunteer's brain activity was measured before and during the eight weeks.

Our brain unconsciously learns to prefer high-fat snacks

The brain's response to high-fat and high-sugar foods was greatly increased in the group that ate the high-sugar and high-fat pudding after eight weeks. This particularly activated the dopaminergic system, the region in the brain responsible for motivation and reward. "Our measurements of brain activity showed that the brain rewires itself through the consumption of chips and co. It subconsciously learns to prefer rewarding food. Through these changes in the brain, we will unconsciously always prefer the foods that contain a lot of fat and sugar," explains Marc Tittgemeyer, who led the study.

During the study period, the test persons did not gain more weight than the test persons in the control group and their blood values, such as blood sugar or cholesterol, did not change either. However, the researchers assume that the preference for sugary foods will continue after the end of the study. "New connections are made in the brain, and they don't dissolve so quickly. After all, the whole point of learning is that once you learn something, you don't forget it so quickly," explains Marc Tittgemeyer.

Cell Metabolism

New Research Reveals a Potential Mechanism for How Coffee May Reduce the Risk of Type 2 Diabetes

EurekAlert 22-MAR-2023

New scientific research investigates inflammation and insulin resistance in habitual coffee drinkers to understand how coffee may reduce the risk of type 2 diabetes (T2D), mediated by inflammatory biomarkers in the body 1.

• Drinking just one additional cup of coffee per day was associated with a 4-6% lower risk of T2D among participants in two large prospective cohort studies, which was partly explained by lower levels of inflammation1.

• Experts consider consuming up to 400mg of caffeine (3-5 cups of coffee) per day to be a moderate and safe amount for most adults. For pregnant or lactating women, caffeine intake should be reduced to 200mg per day2.
• These results further support previous research on the association between higher habitual coffee consumption and lower T2D risk 3-9, especially amongst drinkers of filtered or espresso coffee and non-smokers1.

A new study published in Clinical Nutrition and funded by the Institute for Scientific Information on Coffee (ISIC) has found that coffee consumption may help reduce the risk of type 2 diabetes (T2D), mediated by differences in inflammatory biomarkers in the body. The research assessed the underlying mechanisms by which coffee consumption may help to reduce T2D risk, and found that lower subclinical inflammation may partially explain the association.

T2D is partly considered an inflammatory disease, thus by researching coffee's effect on inflammation biomarkers such as C-reactive protein (CRP), which increases when there is inflammation in the body, the study sought to understand the underlying mechanisms linking higher coffee consumption with a lower risk of T2D3-9.

Using data from the UK Biobank (n=145,368) and the Rotterdam Study (n=7,111), researchers confirmed that a one cup per day increase in coffee consumption was associated with a 4-6% lower risk of T2D. It also predicted further possible favourable impact such as lower insulin resistance, lower CRP, lower leptin and higher adiponectin concentrations in cohort participants.

Adiponectin is a hormone that regulates glucose and lipid metabolism, which has been shown to have anti-inflammatory and insulin-sensitising effects, and leptin is a hormone that regulates food intake and energy homeostasis.

A one cup per day increase was measured against individuals' varying daily consumption rather than a set baseline. Daily consumption within the study cohort ranged from 0 to ~6 cups of coffee per day, with findings suggesting benefits from an extra cup per day regardless whether individuals fell at the lower or higher end of that range.

The study is authored by a team led by Dr. Voortman, who commented: "Coffee is one of the most frequently consumed beverages worldwide and its potential health effects trigger significant scientific research. Previous studies have linked higher coffee consumption to lower risk of developing T2D but underlying mechanisms remained unclear. Our research shows that coffee is associated with differences in the levels of inflammation biomarkers in the body, and as we know that T2D is partly an inflammatory disease, this could be one of the mechanisms at play. These findings could also support future research into the effects of coffee on other inflammation-related chronic diseases."

The research complements the existing body of evidence on the association between coffee consumption and lower risk of T2D, which may contribute to the development of guidance on how nutrition and lifestyle changes support reduction strategies for non-communicable diseases like T2D.

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Tackling Food Insecurity Could Improve Children's Learning

EurekAlert 20-MAR-2023

Indian children's education can be impaired when their households struggle to access enough nutritious food, new research has found. Indian children's education can be impaired when their households struggle to access enough nutritious food, new research has found.

The study, published in the Journal of Nutrition, was undertaken by the Food Security for Equitable Futures research team based at Lancaster University, the Indian Institute of Technology Kanpur and the University of Barcelona.

Food insecurity—difficulties accessing enough nutritious food—can occur over only a short period, or can be a persistent experience for a household, occurring over many months or years. It can also range from mild food insecurity, such as worrying about where the household will get food, to severe food insecurity, which can include skipping meals, going hungry, or going a whole day without eating because of a lack of money or other resources.

The study found that both more persistent and more severe food insecurity were linked to lower test scores and fewer years of education completed. However, food insecurity generally declined between 2009 and 2016. In 2009, 30.4% of households in the study were food insecure. This figure went down to 24% in 2013, then rose slightly back to 25.8% in 2016.

Food insecurity is associated with many child development outcomes and can negatively affect children's cognitive, academic, and psycho-emotional developments. And, while evidence on links between food insecurity and children's educational outcomes is well-established in the Global North, it is scant in the Global South.

The paper 'Children's educational outcomes and persistence and severity of food insecurity in India: Longitudinal evidence from Young Lives' fills this gap. The study is based on data from 2009, 2012, and 2016 of the Young Lives survey for India, which has followed the same children over time.

The research team examined whether severe and persistent food insecurity were associated with children's educational outcomes.

These educational outcomes, measured when children were aged 8, 12, and 15 years old, included scores on a vocabulary test in the local language, scores on a maths test, and the number of years of education the child completed.

The study found that both more persistent and more severe food insecurity were linked to lower test scores and fewer years of education completed. In fact, this study showed even the mildest form of food insecurity is detrimental for children's educational outcomes. This was true even after the team accounted for a wide variety of child and household characteristics that might have explained this association.

For years of education, the researchers looked at how many fewer years of education children in food insecure households completed compared to those in food secure households. Researchers took the overall average score of vocabulary and mathematics tests for all children in the study. They then looked at how far away children in food insecure households were from that overall average and compared the figures to those for children in food secure households.

The study found:

• Children from households that experienced persistent food insecurity ended up completing 0.19 fewer years of education compared with children from food secure households.

• Moderate/severe food insecurity was associated with completing 0.22 fewer years of education.

• Children from households with persistent food insecurity had lower test scores--by 0.15 standard deviations for vocabulary and 0.17 standard deviations for maths.

• Moderate/severe food insecurity was associated with lower test scores, by 0.13 standard deviations for vocabulary and maths.

Postdoctoral Research Associate Dr Thomas Argaw, who led the study, said: "These values may seem to be small in magnitude. However, previous research shows the average effect of educational interventions in the Global South to improve learning do not often go beyond 0.10 standard deviation; this is considered a strong effect."

Filling the Gap: Experts Seek To Boost Knowledge of Ingredient Science and Functions in India's Nutra Sector

Tingmin Koe 13-Mar-2023 – Food Navigator Asia

There can be lack of knowledge in the functions and scientific evidence of nutraceuticals across India's health supplements sector, says an industry advocacy group which is hoping to resolve the problem with the launch of a compendium.

The issue became more prominent when the Indian authorities were drafting the product approval process for nutraceuticals about 10 years ago, said Sandeep Gupta, chief founder and director of the Expert Nutraceutical Advocacy Council (ENAC). This has sparked the idea of working on a nutraceutical compendium to mitigate the challenge.

"There has been a lot of different information floating around for a single nutraceutical ingredient. It was a very complex situation for the regulator to form a perfect set of information," he told NutraIngredients-Asia. "There was no process in place as to what kind of information should be accepted and compounded together in the regulation. At that time, various stakeholders were going to the regulator and sharing information in different fashion…It was a huge challenge to standardise the flow and process of information. At the inaugural Vitafoods India held in New Delhi between February 16 and 17, the book "The Ultimate Compendium of Nutraceuticals" was unveiled by Padma Shri Vaidya Rajesh Kotechaji, secretary of the Ministry of AYUSH.

AYUSH is a government ministry tasked with the revival and propagation of ayurvedic and other traditional systems of Indian medicines. Co-authored by Gupta and Dr. Anish Desai, chief of ENAC and honorary professor of pharmaceutical medicine at Maharashtra University of Health Sciences, the book covers 21nutraceutical ingredients, such as ashwagandha, astaxanthin, coenzyme Q10, melatonin, collagen, fenugreek, omega-3, zinc, and vitamin C.

FOOD SCIENCE & INDUSTRY NEWS

From Food Waste to Functional Ingredients: Study Finds Potential to Transform Cashew Apple Pulp

27 Feb 2023 Nutrition Insight

The underutilized cashew apple pomace (Anacardium occidentale) has nutritional, environmental and economic benefits, according to a review of 26 studies.

Sensory evaluations support incorporating cashew apple pomace in several products, but manufacturers must choose appropriate food products and optimize the formulation.

Pomace or pulp is the material that remains after processing cashew apples into juice. The wet pomace can also be dried to create a pomace powder.

NutritionInsight spoke with one of the review's authors, Nathalie van Walraven, MSc nutritional sciences from the Hebrew University of Jerusalem, Israel, who hopes the study raises awareness of the fruit.

"Currently, many people don't know that there even is such a thing as a cashew apple. Of course, the hope is that this 'fruit' will be utilized instead of wasted." She adds that the cashew apple pomace is a versatile ingredient and "can be incorporated into a wide variety of products."

The authors note that 36.9 million tons of cashew apples are produced worldwide, but only small amounts are used to make juice. The reviewed studies used cashew apple pomace as a food ingredient and performed sensory analyses. Food products incorporating the pomace included burgers, meat substitutes, baked goods, local Brazilian dishes, jam, croquettes and a cereal-based extrudate.

The review found that cashew apple pomace has nutritional, environmental and economic benefits. “In the studies reviewed, the food products that received the highest scores were meat or alternative meat products,” notes Van Walrave. She adds that pre-tests likely contributed to this factor, as did the use of professionals from gastronomy and focus groups for recipe development.

“What products to incorporate should also be adjusted to where the product will be consumed. There are different food traditions and norms that need to be taken into account for success.”

Adding cashew apple pomace (powder) was found to lower the moisture content in some cases, reduce fat and protein content, increase ash and carbohydrates and lowered pH.

Processing conditions can influence product composition. For example, washing the pomace increased pH and fermenting cashew apple pomace powder added to its protein content.

Most studies found that participants preferred products with lower cashew apple pomace (powder) concentrations. If products only substituted low levels of its ingredients for the pomace, organoleptic qualities were comparable to the control product. In some cases, scores improved by adding the powder, such as chicken patties and cereal-based extrudates.

Van Walrave explains different pieces need to come together to make the pomace commercially available and notes that investments are required to address these aspects.

From the producers’ side, infrastructure needs to be developed so that the cashew apples can be collected and then processed, for example, into juice or other beverages and then utilized in food products.

She warns that product development and marketing also need to improve. Without this, “there will not be an incentive for the farmers to collect the apples.”

The study published in Critical Reviews in Food Science and Nutrition also compared the nutritional benefits of whole cashew apples and wet and dry cashew apple pomace. The dry pomace had a lower moisture content but higher macronutrients.

The review found the vitamin C content of cashew apple pomace higher than the concentration in lemons, mandarins, oranges and peppers. However, studies found significant differences (between 6 and 900 mg/100g for dry pomace).

Protein content reached up to 13.8%, higher than commonly found in fruit peel flour (3-6%), while lipid content was relatively low. Dietary fiber content varied considerably in the reviewed studies (35-79%) but was higher than comparable products, such as dried peach pomace (30.7%).

Although levels of soluble dietary fiber (8%) were higher than those found in lemon pomace (6.7%), it was lower than for carrots (22.7%), apples (20.3%) and orange pomace (13.4%).

By Jolanda van Hal

Better For People and the Planet? Scientists Say Blue Foods Hold the Key to Nutrition and Climate Issues

23 Feb 2023 Nutrition Insight

Increasing the consumption of foods that come from the ocean or freshwater environments could address global challenges such as nutritional deficits, disease risk, greenhouse gas emissions and climate change resilience, according to an international team of researchers working with the Blue Food Assessment.

'Blue foods' is the term used to describe the complete range of foods – both plant- and animal-based – that can be harvested from water sources. The scientists, hailing from Canada, Chile, China, India, Malaysia, the Netherlands, Norway, Sweden, the UK and the US, reveal that utilizing more ocean and freshwater food sources could increase food and nutrition security, while preserving planetary health.

"Even though people around the world depend on and enjoy seafood, the potential for these blue foods to benefit people and the environment remains underappreciated," says Ben Halpern, a marine ecologist at the University of California in Santa Barbara and director of the National Center for Ecological Analysis and Synthesis.

The study, published in Nature, identifies four roles that blue foods could play in improving national food systems' sustainability and performance. These include reducing vitamin B12 and omega 3 deficiencies, reducing the rates of cardiovascular disease associated with excessive red meat consumption, reducing environmental impacts and improving climate adaptation and resilience.

The researchers highlight the need for policymakers to understand the diverse contributions that blue foods can make and consider the trade-offs that may need to be negotiated. However, they note that reducing health and environmental impacts can also reduce pressure on social systems.

According to the study, policymakers in countries with high environmental footprints and high levels of cardiovascular disease should focus on improving access to blue foods. In contrast, policymakers in nations with high environmental footprints and high nutrient deficiencies could support greater diversity of blue food production and promote lower-cost blue foods.

"Blue foods can play important roles in our diets, societies and economies, but what exactly this looks like will differ greatly from one country and local setting to another," says Beatrice Crona, lead author, professor at Stockholm University and co-chair of the Blue Food Assessment.

Promoting more freshwater or marine seafood could displace some red and processed meat consumption and lower the risks and rates of developing heart disease. Moreover, blue food can result in a more environmentally friendly and sustainable food system.

The researchers explain that aquatic food production exerts relatively lower environmental pressures than terrestrial meat production and a shift toward more blue foods could lower the toll that producing terrestrial livestock takes on the earth. Furthermore, they state that carefully developed aquaculture, mariculture, and fishing can ensure the livelihoods of hundreds of millions of people worldwide.

"With this work, we bring attention to these many possibilities and the transformative benefit that blue foods can have for people's lives and the environments in which they live," stresses Halpern.

Edited by William Bradford Nichols

Researchers Create Fully-Biodegradable Polymer from Carrots

22 Feb 2023 Nutrition Insight

Canadian researchers have developed a carotenoid-sourced compound to make a fully-degradable, soluble polymer that disintegrates with acid and sunlight. They note that the work lays the foundation for a new class of fully degradable conjugated polyazomethines that uses building blocks from nature.

The research team combined 10-carbon dialdehyde and p-phenylene-diamine to make three polyazomethines with different side chains. The resulting materials ranged in colours from black to bright red after drying.

The researchers could also improve the polymer's solubility by changing from methyl to hexyl side chains through side-chain engineering. Solubility makes the polymer easier to characterize and process. In initial experiments, the team determined that the polymer created with p-phenylenediamine containing two hexyl side chains was the best candidate to test further.

The research team notes that side engineering is a promising strategy to tune properties to meet specific application needs, such as conductivity and environmental compatibility. The researchers assessed the side chain modification's influence on the polymer's solubility with nuclear magnetic resonance, gel permeation chromatography, infrared spectroscopy and ultraviolet-visible absorption spectroscopy.

In testing the degradation of the resulting polymer, the researchers determined that it could be degraded with both acidic and artificial sunlight conditions. Acid hydrolysis accelerated the polymer degradation rate and artificial sunlight generated additional degradation products.

The polymer completely broke down into its original components in acidic solutions. However, over an extended period, the sample broke down even further into smaller dialdehydes and other compounds in the presence of light.

According to the researchers, follow-up research will include evaluating the polymer's ability to conduct electricity, yield polymers with a higher molecular weight and investigate the recovery of monomers. They add that exploring enzymatic degradation that mimics nature in follow-up degradation studies would be interesting.
The University of Toronto, Canada, research team published their results in the Journal of the American Chemical Society.

The molecular structure of carotenoids, such as ß-carotene, resembles polyacetylene, a well-known conductive but insoluble polymer. Carotenoids, derived from carrots, are interesting compounds as they are expected to transfer charges and have known degradation pathways, the researchers explain. However, these have yet to be widely tested in polymer design.

Many polyazomethines with sufficient electron mobility do not benefit the environment, as they use non-biobased monomers or hazardous agents, according to the study.

Carotenoids can be degraded in several ways, giving alternative options to lessen the compound when integrated into different polymer systems. Carotenoids are susceptible to UV light and enzymatic and chemical oxidation damage.

The research team obtained 10-carbon dialdehyde from β-carotene with oxidative degradation.

This commercially available compound has di-aldehyde functionality, which means it can be used directly in polycondensation reactions without further needing other synthetic modifications.

P-Phenylenediamine derivatives were selected as these are used to synthesize other degradable conjugated polymers and their toxicity has been well documented.

Polymers and plastics from natural, biodegradable ingredients are increasingly demanded in consumer products and packaging.

These offer a more sustainable alternative to conventional non-biodegradable plastics of fossil origin.

The researchers note that other natural compounds have also been incorporated into electro-conducting polymers, as these are commercially available and inherently present in nature.

Compounds such as indigo, vanillin and eumelanin have been used in biobased polymers attractive for energy storage, biomedical and sensor applications.
Edited by Jolanda van Hal

Underutilized Jackfruit Tipped As "Future Superfood" But Only If Production and Post-Harvesting Improve

23 Feb 2023 Nutrition Insight

Deterioration of jackfruit quality during storage and transport limits the ingredient, nutritional and market potential of the fruit, according to a review of its phyto-nutrient profile and post-harvest quality management.

The highly versatile fruit is a source of carbohydrates, protein, fibre, vitamins, minerals and several phytochemicals.

Professor Zora Singh at Edith Cowan University, Australia, notes that with intensive research on jackfruit production and post-harvesting practices, the fruit "can become the

future 'superfood' to fulfil the nutritional needs of the growing world population due to its high medicinal value and excellent nutritional composition."

Additionally, improving these systems can have lasting effects on local economies, highlights Lisette Brouwers, product manager of food at Fairtrade Original.

Brouwers notes that when the company started sourcing young jackfruit from Thailand, it was a welcome addition for the area's farmers.

Before, farmers harvested smaller fruits to allow other fruits to grow, which were consumed at home. Only mature jackfruit was sold on local markets. Fairtrade Original introduced canned young jackfruit pieces in 2019 and pulled young jackfruit in 2021. "This new market for the young jackfruits made it possible for the farmers to expand their business and enhance their financial situation."

Jackfruit (Artocarpus heterophyllus) is the largest fruit grown worldwide in tropical and subtropical regions. The authors explain that several products can be prepared from jackfruit rind, seeds and (unripe) fruit. Products include jam, fermented beverages, dried jackfruit, preserves, candy, chips and juice.

Jackfruit pulp is used to flavour beverages and ice cream, while the seeds have potential in flour production due to their high protein and amylose content. Also, jackfruit starch could be used as a medicine carrier, a binding agent or an emulsifier and has potential for meat alternatives.

Demand for jackfruit is growing. Brouwers notes that "more brands are offering jackfruit in the market and jackfruit-derived products are being developed." However, according to Singh, it is still an underutilized fruit crop. He notes that no identified superior jackfruit genotypes exist. Instead, cultivars are known by different local names, making it difficult to commercialize the crop.

Moreover, only 30-35% of the fruit is edible. The rest, seeds, peel, rag and core, are considered waste and consumers might dislike the fruit as "the intense fruit aroma is unbearable to some people," notes Singh. There is also "no uniformity among the fruits in size, shape, fruit and pulp colour and fruit firmness, which further results in difficulty in fruit marketing." The fruit's large size makes fruit handling and post-harvest operations challenging.

Plant-based diet

Brouwers emphasizes the fruit's potential in meat alternatives. Although young jackfruit does not meet the protein values of meat replacers, "the bite and appearance make young jackfruit a well-loved meat alternative. When pulses, nuts or other plant-based ingredients high in protein are consumed throughout the day, young jackfruit fits well into a plant-based diet. The future generations will be more familiar with plant-based as such and do not seek so much the shape and taste of meat," notes Brouwers. "This allows plant-based products like pulses, jackfruit or banana blossom to become more interesting than the processed meat replacers."

By Jolanda van Hal

REGULATORY NEWS

Bringing To the Boil: India Launches Basmati Rice Standards amid Longstanding Geographical Dispute

By Pearly Neo 22-Mar-2023 – Food Navigator Asia

India's food safety authority has launched a set of formal standards for the premium Basmati rice variant in what appears to be a further step in its quest to establish it as intellectual property belonging to the country under the protection of Geographical Indications (Gis).

India and Pakistan are the only two exporters of Basmati rice globally, which is a major source of income for many farmers in both countries due to its premium status across many markets. Both nations have been engaged in a bitter brawl over this rice and who the GI Tag and protection for this commodity should belong to for many years.

Things came to a head in 2018 when India applied to the European union for exclusive GI rights over Basmati – a situation which would very likely result in challenges for Pakistan Basmati exports to enter the EU market, one of its largest.

Pakistan protested this application, highlighting that India is not the only producer and exporter of the rice and also went on to register Basmati under GI protection locally in 2021. Although the EU accepted Pakistan's Notice of Opposition to India's GI application, negotiations and consultations are still underway, with industry experts generally believing that it will take years time for a resolution to be reached unless both nations acquiesce to file a joint GI application.

That said, this amicability does not appear to have materialised in India as the Food Safety and Standards Authority India (FSSAI) recently launched a set of formal safety and quality standards for Basmati rice. "Basmati rice is a premium variety of rice cultivated in the Himalayan foothills of the Indian sub-continent - it is a widely consumed variety of rice both domestically and globally," FSSAI CEO G. Kamala Vardhana Rao said via a formal statement.

"Basmati is premium quality rice and fetches a higher price than non-basmati varieties, so it is prone to various types of adulteration for economic gains such as undeclared blending with other non-basmati varieties.

In order to ensure a supply of standardised genuine Basmati rice in domestic and export markets, FSSAI has established regulatory standards that have been framed through extensive consultations with the concerned government departments / agencies and other stakeholders as well."

Though framed in the very valid context of preventing food adulteration, FSSAI's establishment of these standards did not officially include Pakistan as part of the consultation process, and India's decision to launch these standards are likely to give it a leg up in its trademark claim battle by establishing its authority as the 'owner' of Basmati rice to set regulatory requirements for it.

That said, the agency also acknowledged that not Basmati is supplied and exported by India, although it does account for two-thirds of the global supply. The new standards will come into effect on 1 August 2023.

Certification Clarity: Vegan Logo Application Only Needed For Processed Food Products - India Food Safety Authority

By Pearly Neo 28-Mar-2023
Food Navigator Asia

The Food Safety and Standards Authority of India(FSSAI) has assured food firms dealing in 'vegan by default' products that they do not need to have the new national vegan logo displayed on their products and need not undergo the certification process as a result.

FSSAI formally launched the national Vegan logo in 2022, mandating traceability as well as compliance with new specific vegan regulations as key criteria for food firms looking to pass the certification process and be endorsed to get the logo to display on all relevant products.

The process is not a simple one, with applicants having to follow a strict set of guidelines and fill out multiple forms, submit various supporting documents and sign a self-declaration form guaranteeing the absence of any ingredients of animal origin, down to the enzymes, flavourings and other additives level.

It is also a costly one – all applicants need to pay FSSAI a fee of INR 25,000 (US$305.45) per application, and FSSAI has also specified that one application is needed per variant of every product – e.g. a plant-based milk that has four flavours will need to make four applications and pay the fee four times, with GST taxation not even included in this. The authority has understandably received a large number of queries and complaints about this, but it has not backed down on its stance regarding payments or the application process, instead highlighting that 'vegan by default' products do not need to apply at all.

"FSSAI has decided to implement stricter guidelines to submit applications for the endorsement of the Vegan logo but products which are vegan by default do not need to apply for this vegan logo," FSSAI Standards Advisor Harinder Singh Oberoi said via formal documentation. This includes agricultural commodities e.g. rice, cereals, pulses, oil seeds, fruits as well as those that are minimally processed without the addition of other ingredients e.g. oil and wheat flour; or a mixture of these ingredients without adding any others. All other products will need to make the application and display the Vegan logo accordingly."

However, this does not bode well for smaller firms that are specialising in plant-based manufacturing or making many of such products, as the cost of application is likely to be heavy for these firms. "FSSAI could do well to work with the industry to better prepare entrepreneurs on compliance and managing the transition as this move could crush them," Plant Based Foods Industry Association India CEO Sanjay Sethi told us.
"It has never happened in this past for any nascent industry, where the start-ups are subjected to such significant challenges instead of receiving guidance from industry stalwarts."

Plant-based products, particularly those created as alternatives to dairy products, have faced mounting hurdles from both FSSAI as well as the local dairy sector in terms of using any dairy-related terms including the innocuous 'milk' or 'yoghurt' on product labels or marketing, even when used together with the term 'plant-based'.

In 2021, FSSAI ordered all online and offline retailers selling such products to be delisted from sale, and the situation remains in limbo even thought a Delhi High Court judge put a stay on this order later that year. More recently, FSSAI ordered local authorities throughout India to crackdown on plant-based ghee (clarified butter'), calling for all products labelled as 'plant-based ghee/butter' or 'vegan ghee/butter' that were being 'sold deceptively' to consumers to be ferreted out and removed from public circulation.

This move clearly demonstrates that FSSAI has no intention of loosening its regulations and management surrounding the plant-based sector locally, further supported by the mandate for all such products to carry the Vegan logo as well as the high fees associated with the application.

AHPA Responds to Proposed US FDA Legislation: Supplements "Should Bear Healthy Claims"

28 Feb 2023 Nutrition Insight

Dietary supplements should be exempted from proposed legislation that redefines what is "healthy" according to the American Herbal Products Association (AHPA). In submitted comments, the organization urges the US Food and Drug Administration (FDA) to change its proposed rule to update "healthy" claims for food products.

In the proposed FDA rule, foods may bear a "healthy" claim when they contain a specific quantity from a particular food group or equivalent and meet added sugar, sodium and fat limits. Most supplements would not comply with these requirements, states the AHPA.

Robert Marriott, AHPA director of regulatory affairs, notes, "Dietary supplements, unsweetened coffees and teas, and herbs and spices should be able to bear 'healthy' claims. We have expressed this position to FDA in our comments, among other requests that support uses of the term 'healthy' that will help consumers make beneficial diet choices."

The organization argues that prohibiting the use of "healthy" claims on supplements would create confusion amongst consumers and be inconsistent with the goals of the proposed rule and the Dietary Guidelines for Americans to promote healthy dietary practices.

Suggested changes

As the proposed change could prohibit the use of "healthy" on any dietary supplement, the AHPA requests the FDA to exempt supplements from the claim requirements altogether. The rule could create consumer confusion regarding the benefits of supplements, especially if conventional food products that contain comparable or lower amounts of nutrients are entitled to be "healthy," adds the organization.

It would also create confusion regarding authorized claims on supplements that use the word "healthy," such as claims that a nutrient maintains a healthy structure or function. It is unclear to what extent these claims would still be authorized with the proposed rule.

The AHPA encourages the FDA to permit "healthy" claims for unsweetened coffees and teas and for products consisting of single or mixed herbs that do not include sodium, added sugars, or saturated fats. According to the organization, this would stimulate consumers to use such products over less healthy alternatives. AHPA also recommends the FDA refrain from reducing sodium limits applicable to "healthy" claims due to a lack of new evidence supporting such a reduction.

The case for dietary supplements

In case the FDA rejects its proposal, the AHPA suggests two alternatives. The FDA could exempt supplements from the proposed food group equivalent requirements. Most will not be able to meet these requirements, even though supplements can promote a healthy dietary pattern. Alternatively, the FDA could revise the rule to allow "healthy" claims on supplements containing vitamins and minerals essential in human nutrition, including nutrients of public health concern.

discretion for products already on the market at the time of the revised rule's compliance date.

By Jolanda van Hal

FDA Draft Guidance Pushes for Voluntary Nutrient Labels on Plant-Based Milk

23 Feb 2023 Nutrition Insight

The US government has made recommendations that plant-based milk should carry a label pointing out the nutritional difference between dairy milk and alt-milk. Officials suggest a voluntary label reform that could see brands specifically saying cow milk has a "better" nutritional profile than milk made from soy, coconut, oat, almond, and other plant-based ingredients.

According to the Food and Drug Administration (FDA), any plant-based milk alternative product that includes the term "milk" in its name (e.g., "soy milk" or "almond milk") and that has a nutrient composition that is different from milk, should include a voluntary nutrient statement that conveys how the product compares with milk.

And the statement should be based on the United States Department of Agriculture (USDA)'s Food and Nutrition Service fluid milk substitutes nutrient criteria. For example, the label could say: "Contains lower amounts of Vitamin D and calcium than milk." The FDA has ruled that plant-based milks can continue to use the term "milk."

ProVeg International – which had raised concerns over the potential for the US government to clamp down on plant-based alternatives being allowed to use words like "milk" – is breathing a sigh of relief on the draft guidance and claiming "a victory for common sense."

"We hope that the EU will take note," says Jasmijn de Boo, vice president of ProVeg International. "Everyone knows that oat milk, for example, is from oats and not from cows. Studies have shown that consumers are not confused. The FDA has taken the right approach, and we hope this helps to bring an end to the restriction of plant-based labels in other parts of the world," she asserts.

"Dietary supplements are intended to support a healthy diet and lifestyle and, as per the current dietary guidelines, a healthy diet can include herbs and herbal products," notes Marriott.

Michael McGuffin, AHPA's president, adds: "AHPA and our members know dietary supplements and herbal products inside and out; these products can help consumers maintain healthy dietary patterns. We will continue to advocate for these products to be able to bear 'healthy' claims."

Proposed FDA rule

Currently, the food labelling regulation sees the term "healthy" as an implied nutrient content claim. It establishes specific criteria for these claims on the levels of (saturated) fat, cholesterol and other nutrients present in different food categories permitted to make these claims. The FDA issued the proposed rule to update the regulation to align it with current federal dietary guidelines better. The AHPA requests further enforcement

In addition to the increase in market availability and consumption, the variety of alternative products available in the marketplace has also greatly expanded from soy, rice, and almond to include cashew, coconut, flaxseed, hazelnut, hemp seed, macadamia nut, oat, pea, peanut, pecan, quinoa, and walnut-based beverages. Although these products are made from liquid-based extracts of plant materials, such as tree nuts, legumes, seeds, or grains, they are frequently labelled with names that include the term "milk."

The draft guidance entitled "Labelling of Plant-based Milk Alternatives and Voluntary Nutrient Statements: Guidance for Industry" details how dairy foods, including milk, are recommended by the Dietary Guidelines as part of a healthy eating pattern and contribute multiple key nutrients, including protein and vitamins A and B-12, along with calcium, potassium and vitamin D, which are currently under-consumed.

According to the FDA, the Dietary Guidelines only include fortified soy beverages in the dairy group because their nutrient composition is similar to that of milk. However, the nutritional composition of plant-based milk alternative products varies widely within and across types, and many do not contain the same levels of crucial nutrients as milk, the agency flags. This is underscored as the consumption of plant-based milks is increasing with a significant diversification of ingredients.

"Getting enough of the nutrients in milk and fortified soy beverages is especially important to help children grow and develop, and parents and caregivers should know that many plant-based alternatives do not have the same nutrients as milk," says Susan T. Mayne, director of the FDA's Center for Food Safety and Applied Nutrition. "Food labels are an important way to help support consumer behaviour, so we encourage the use of the voluntary nutritional statements to help better customers make informed decisions."

By Gaynor Selby

Singapore's Nutri-Grade Labelling Influences Consumers to Make Healthier Choices, Duke-NUS Trial Reveals

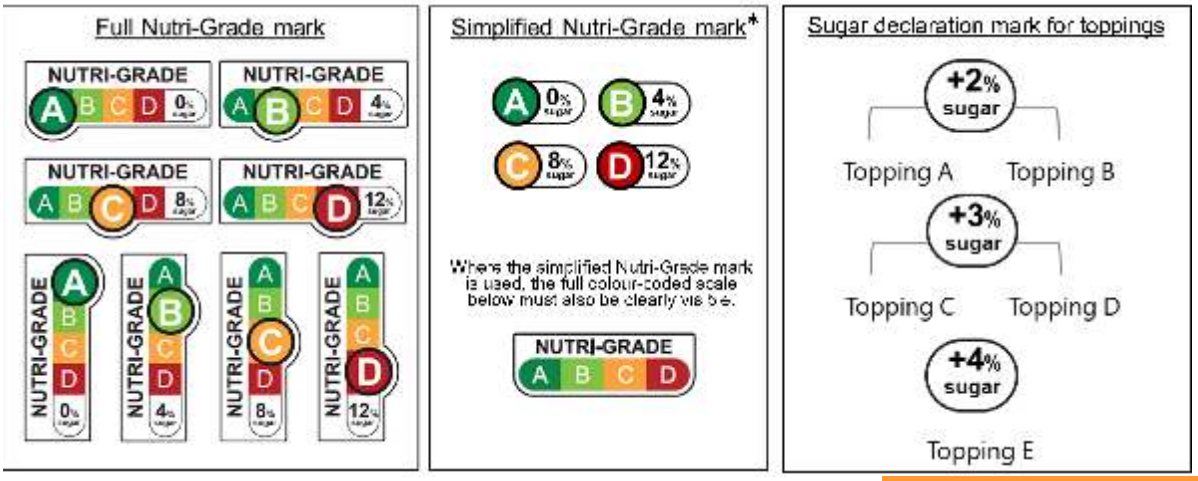
EurekAlert 21-MAR-2023

Singapore's new mandatory labelling system—called Nutri-Grade (NG)—is likely to encourage consumers to purchase beverages with lower sugar content, suggests a trial by researchers at Duke-NUS Medical School.

The findings, published in the International Journal of Behavioural Nutrition and Physical Activity, show that NG labelling can empower people with chronic conditions such as diabetes to make healthier choices, with trial participants opting for drinks with 1.5g less of sugar per serving—equivalent to about 2.9g of sugar per 330ml can.

Instituted by the Singapore government in December 2022, the colour-coded NG labelling system was introduced to help consumers identify healthier drinks. The new front-of-pack NG system currently grades pre-packed beverages on a four-point scale, from A (lowest in sugar and saturated fat) to D (highest in sugar and saturated fat).

Figure 1: Nutri-Grade Grading System
Image Source: https://hpb.gov.sg/



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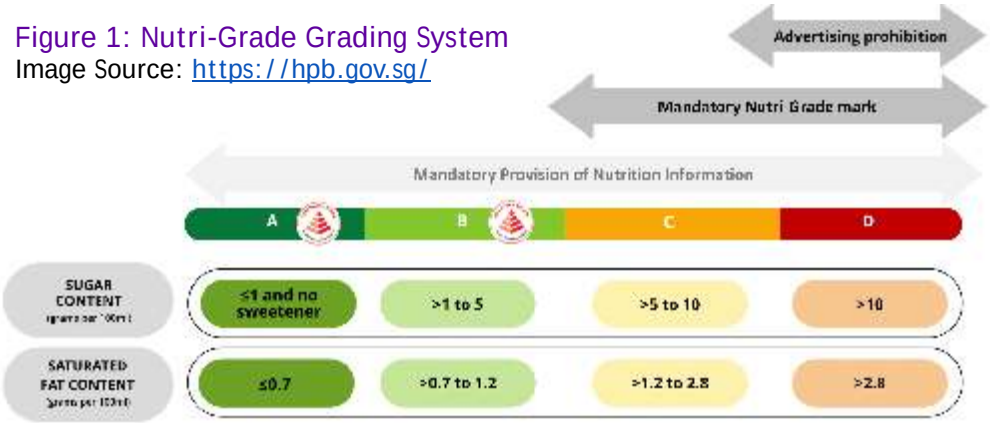

Note 1: Concession will be provided for individuals and entities operating a smaller food business that involves the sale of a freshly prepared Nutri-Grade beverage.
Note 2: The sugar content of the beverage is determined by its total sugar content, minus the amount of lactose and/or galactose that is declared on the Nutrition information Panel (NIP).

The NG label complements the Healthier Choice Symbol currently displayed on selected food and drink items, which aims to help consumers make informed purchases and pave the road to reducing the currently increasing levels of non-communicable diseases such as cancer, diabetes, heart disease, etc.—an epidemic that Singapore shares with many other countries.

"Singapore now has the highest prevalence of diabetes among developed countries," said Professor Eric Finkelstein from Duke-NUS' Health Services and Systems Research (HSSR) programme and senior author of the study. "Our work was designed to assess whether the NG system might help combat this problem."

In the study, which was conducted before the official implementation of the NG labelling system, the research team recruited 138 participants to shop for groceries in their experimental online grocery store called NUSMart. This online store mimics real web-based grocery stores in Singapore and has already been used in other research publications.

To evaluate whether the NG labels affect what consumers purchased, the participants were exposed to two different shopping experiences—with or without the new NG labels on pre-packaged beverages in the presence of the Healthier Choice Symbol logos.

"The results revealed that the NG labels were effective in increasing purchases of beverages that were rated A or B—the healthier drinks," said Dr Soye Shin, Research Fellow from Duke-NUS' HSSR programme and first author of the study. "Compared to what was bought during the shopping experience without the NG labels, those bought with the NG labels had a reduced sugar content of 1.5 grams per serving."

But the study showed that there were no significant differences in the total calories, saturated fat or other nutrients present in the purchased goods—likely because beverages account for a small part of the total shopping basket.

"This reveals the limits of a labelling system focussing on only pre-packaged beverages," added Prof Finkelstein, who is also a health economist with Duke-NUS. "The government has recognised this and will be expanding Nutri-Grade to freshly prepared beverages by the end of 2023."

"The Duke-NUS study affirms that the Nutri-Grade mark is a good tool in guiding consumers to identify and choose beverages lower in sugar," said Mr Terence Ng, the Director of Policy and Strategy Development at the Health Promotion Board. "With the extension of these measures to freshly prepared beverages in end 2023, we aim to help Singaporeans reduce sugar consumption through beverages over time."

US FDA Explores Front-Of-Pack Labelling Again, but Early Discord Suggests Uphill Battle

By Elizabeth Crawford 31-Jan-2023 – Food Navigator Asia

FDA once again is considering front-of-pack labelling "to help consumers interpret the nutrient information on food products," including testing a controversial traffic light approach to show when a product is high or low in select nutrients and a design that recalls the industry-created voluntary Facts Up Front system.

"The United States continues to face an epidemic of diet-related chronic diseases, many of which are experienced disproportionately by racial and ethnic minority groups, those with lower socioeconomic status and those living in rural areas. To help address this problem …we are exploring the establishment of a standardized, science-based FOP scheme that helps consumers, particularly those with lower nutrition literacy, quickly and easily identify foods that are part of a healthy eating pattern," the agency said in a Federal Register notice published last week.

Building on a literature review and focus group tests of FOP concepts conducted last year, FDA plans to gather 3,000 consumers responses to several science-based designs that fall into three general groups. FDA to test consumer understanding of different designs.

The first include black-and-white and green-yellow-red designs similar to the existing Facts Up Front system created by FMI – The Industry Trade Group and the Grocery Manufacturers Association (now the Consumer Brands Association) in the fall of 2011, which earned limited support from FDA at the time and biting criticism from the Center for Science in the Public Interest.

Like the Facts Up Front scheme, which was on upwards of 90% of packaged foods with in years of rolling out , FDA's first proposed design includes an icon that highlights calories per serving and whether there are low, medium or high amounts of saturated fat, sodium, added sugars, fibre and calcium. FDA also is exploring versions that call out the daily value amount of each nutrient and colour-coded versions with high in red, medium in yellow and low in green.

The second group of images are small boxes reminiscent of the Nutrition Facts boxes on the back panel, but those on the front panel will be called Nutrition Tips and once again characterize the amounts of saturated fat, sodium, added sugar, fibre and calcium as low, medium or high with some versions including stoplight colour coding and the percent daily value of each per serving.

The final group also mimics the look of the Nutrition Facts panel but simply says High In and then lists the nutrients of concern (saturated fat, sodium and added sugar) with some versions also including the percent of daily value per serving.

FDA's announcement comes months after the Biden Administration released a 44-pagestrategy document to reduce the intake of added sugar and other nutrients of concern ahead of the White House Conference on Hunger, Nutrition and Health. In it, the administration called on FDA to explore FOP labelling schemes with an eye towards developing standardized system for packaged food to help consumers identify foods that are part of a healthy eating pattern.

FDA also notes its current review comes after "increased attention in recent years … and the experience of countries that have adopted FOP labelling … that suggests that FOP labelling may aid nutrition comprehension and the ability to make healthier choices." Analysis of the voluntary Facts Up Front scheme also found the labelling was associated with improved nutritional quality, and could be an effective tool for encouraging change on an industry level.

This not the first time that FDA has considered FOP labelling. In 2010, the agency called for industry comments on FOP labelling following public outrage about what many saw as abuse of the FOP Smart Choices labelling program. Then, like now, FDA noted FOP labelling could help consumers make healthier choices, but unlike then when FDA put forth the idea as voluntary, this time the agency is considering making the labelling mandatory – which would close a loophole in which less healthy foods avoid FOP labels that could discourage sales.

While industry supports the voluntary Facts Up Front labelling scheme, CBA's Sarah Gallo, vice president of product policy, told FoodNavigator-USA when the White House floated the idea of mandatory scheme that it could inadvertently hurt consumers, but that it supports voluntary FOP labelling.

CSPI, however, said it was 'thrilled' by the idea and reiterated its call for a front-of-pack labelling system that was scientifically-based, mandatory and standardized, which it also called for in a Citizen Petition filed with FDA last summer .

Other stakeholders have expressed concern that traffic light colour-coding could discourage consumers from looking at the Nutrition Facts panel or from considering how each food fits into their overall diet.

Trans-Fat Reduction: Asian Nations 'Gaining Momentum' With Reformulation Policies – WHO

By Si Ying Thian 28-Feb-2023 – Food Navigator Asia

Sri Lanka, Nepal, Bhutan, and Indonesia are making headways towards trans-fatty acids (TFA) elimination, but national policy is still lagging behind for South Korea, Brunei, and Fiji.

The findings were based upon the fourth annual report by the World Health Organization (WHO), which monitors the global progress in 2022 towards WHO's global TFA elimination goal by 2023. "Introduction of best-practice policies across the South-East Asia Region would potentially result in an estimated 178 600 lives saved per year," states the organisation. "If the remaining countries in the Western Pacific Region adopted best-practice policies, it is estimated that more than 132 000 lives per year would be saved in the region."

The 2022 report was prepared by WHO's Department of Nutrition and Food Safety and Resolve to Save Lives (RTSL), a global public health non-profit organization. Specific country data were provided by the WHO regional and country offices.

The research found that global TFA elimination efforts were concentrated mostly in higher-income countries and the Americas and Europe regions. Globally, India and Philippines became the first two lower-middle income countries to pass a best-practice policy in 2021.

Best-practice policy entails a national limit of 2g of industrially produced TFA per 100g of total fat in all foods, and a national ban on the production or use of partially hydrogenated oils (PHO) as an ingredient in all foods. India's policy was effective since January 2022, which will offer protection to approximately1.4 billion people (41% of the population in lower-middle income countries). Philippines' policy will take effect from July 2023 onwards.

Among its developed counterparts in APAC, Thailand became the first country to adopt the best-practice TFA elimination policy, and third in the world to implement a PHO ban since2019. This was followed by Singapore and Hong Kong in 2020.

One of the observable trends among some countries in South-East Asia is the gradual transition in their efforts towards a best-practice TFA elimination policy. As some of the biggest producers of tropical oils such as palm oil and coconut, which are high in saturated fats, eliminating it in one go can be contentious. Hence, WHO encourages countries to develop a replacement roadmap detailing discussion and plans to seek out healthy replacements and alternative techniques in the country.

Indonesia, for example, was documented to have a high consumption of fatty foods which puts the population at risk of TFA overconsumption. However, there has been a growing interest in eliminating TFA, and the Indonesian government and civil society organizations have been working with WHO on strengthening their capacity to implement changes.

Another case study is India, where its statutory board Food Safety and Standards Authority of India (FSSAI) has rendered technical assistance to SMEs by developing their skills to produce healthier and cost-effective alternatives to TFA-containing PHO. FSSAI also adopted a multi-stakeholder approach to tap on the expertise and get the buy-in of industry associations and government bodies, to encourage SMEs to adopt technologies to reduce TFA in their manufacturing processes.

For South Korea, Brunei, and Fiji, they presently do not have a national policy stipulating a ban or restriction on TFA. South Korea and Brunei do both encourage reformulation to reduce or eliminate TFA, while Brunei and Fiji ensure that that the presence of TFA in products are labelled on its packaging.

Moving forward, the report highlighted that WHO would focus on capacity-building efforts, and the efforts would target resource-poor countries with an interest to reduce TFA: "Over the coming years, the focus of WHO and its partners' efforts will be on those countries that are poised to pass best-practice policies. WHO will also concentrate attention on countries that have some interest in introducing a TFA regulation but have not yet taken action, or lack the capacity, to do so. "

Source: Countdown to 2023: WHO report on global trans-fat elimination 2022