

PFNDAI

# FOOD, NUTRITION & SAFETY MAGAZINE

BULLETIN SEP 2021

## CONVERGING TOWARDS A **HEALTHY WALK,** THROUGH LIFE

Dr B Sesikeran

### CAN **FOOD LABELS** HELP CONSUMERS EAT **HEALTHY?**

SubbaRao M Gavaravarapu, Priyadarshini S  
& Sudershan Rao V

### LET'S GET READY TO CELEBRATE **NATIONAL NUTRITION** **MONTH, 2021**

Ms Nikita Mitra

### ARE **FROZEN FRUITS &** **VEGETABLES** REALLY HEALTHY?

Prof. Jagadish Pai

### **RIGHT NUTRITION** FOR **CHILDREN** TO SUPPORT **HEALTHY LIFE**

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# INDEX



**COVER  
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## Editorial

Converging Towards a Healthy Walk, ..... Through Life By Dr B Sesikeran, MD	1
Can Food Labels Help Consumers Eat Healthy? ..... By SubbaRao M Gavaravarapu, Priyadarshini S & Sudershan Rao V	5
Let's get ready to celebrate ..... National Nutrition Month, 2021 By Ms Nikita Mitra	11
Coming Events .....	14
Right Nutrition for Children ..... to Support Healthy Life By Dr Swati Shukla	15
Fructooligosaccharide: The Sweet Fiber .....	20
By Dr. Malathy Venkatesan	
Are Frozen Fruits &Vegetables Really Healthy? .....	24
By Prof. Jagadish Pai	
Report on 'Webinar on Plant Protein ..... for a Healthy Tomorrow' By Ms Dolly G Soni	27
Report on PFNDAI Regulatory Webinar on Mandatory... Declaration of FSSAI License no. on sale of Food Products By Ms. Koumudi Chavan , Ms Shreya Shah & Ms Anuja Rawool Padte	31
Regulatory Round Up .....	34
Research in Health & Nutrition .....	35
Food Science and Industry News .....	41
Regulatory News .....	48

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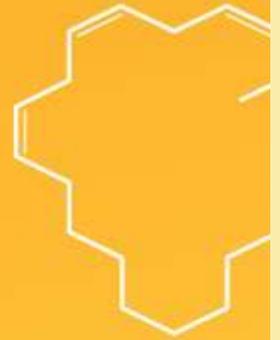
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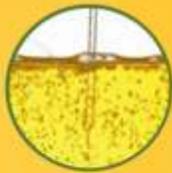
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# EDITORIAL

The Ministry of Women & Child Development sent a communication on 27th Aug 2021 announcing the theme of this year's Rashtriya Poshan Maah (National Nutrition Month) as "Converging Towards a Healthy Walk Through Life".

It is really a well-thought theme so nicely coined to cover the entire span of our life from infancy to old age. It not only provides need for good nutrition but a thought is given to physical activity by using the simplest one in the form of walking. Combining all these will provide the health.

It is beautiful, we wish it had come a little earlier which would allow enough time to organise various activities under the programme normally carried out during the National Nutrition Month in various schools and colleges and other places where awareness needs to be created. This activity should not be just a knee-jerk reaction which is quickly carried out as per government directive and then forgotten until next year again when new theme is given. It should be a dedicated activity which if carried out diligently could bring out the change envisaged by the theme bringing health to individuals.

We certainly support the physical activity which depends on each individual as per the liking and capacity and availability of space and environment to carry out either yoga or athletic activity in a sports club or in an open ground or as some people have shown even on footpaths.

This brings us to questioning ourselves about what we can do? We try to create awareness about food, nutrition and safety so let us try to promote the foods that are healthy and safe. It has been seen in commercial scenario that unless consumers are provided tasty and flavourful food products, they are not going to willingly accept these even when they are very healthy. Let us try to think of all kinds of possibilities that make food products healthier.

It does not mean that we must convert our sweets to a completely balanced food products and still taste like an indulgent delicacy. However, we can take a few baby steps to make them better either by reducing a little sugar and calories from fat, as a campaign earlier had coined the phrase "Aaj se Thoda Kam" (a little bit less) or by adding some ingredients that would provide dietary fibre and protein or by fortifying with vitamins and minerals.

With slow progression people can get used to these slight changes which over the long run will work out to be substantial changes leading to much healthier foods and diets for healthier persons. Let us take this pledge this month and try to follow up wherever we are and whatever we eat.

Prof Jagadish Pai,  
Executive Director,  
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# CONVERGING TOWARDS A HEALTHY WALK, THROUGH LIFE



**AUTHOR**  
**Dr B Sesikeran, MD**

Chairman, Scientific Advisory  
Committee, PFNDIAI

Former Director, National Institute  
of Nutrition, Hyderabad

This theme for Nutrition Month Sept2021 is a very loaded statement and goal. We all need to converge towards this goal in our lives.

Go through life or walk-through life and not drive through life since we were created to walk. Walking will take us through a healthy life.

The concept of HEALTHY

encompasses good nutritious food throughout life.

Without sufficient food that is balanced and contains all the required macro and micronutrients in the required quantities, staying healthy is not possible.

Good nutrition is not only for adults or children or women or any specific age group but for every individual starting from the intra uterine phase right from conception until death.

Mothers who are undernourished or deficient in micronutrients may end up having a fetus that gets epigenetically programmed to spend its entire life conserving energy as fat in the body. Such lives could be one of a high risk for non-communicable diseases.

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Adolescence is the most active part of life and needs good nutrition to fuel the physical growth and the needs of high levels of physical activity. At this stage if there is a history of undernutrition in the past or a deviation from nutrient rich foods to energy rich nutrient poor foods the growth will tip over to a body with more fat and less muscle. It will become a fertile ground for the development of chronic non-communicable diseases like Obesity, diabetes, hypertension, cardiovascular diseases, cerebrovascular diseases, cancer and many more.

A possible rescue from all these problems is regular physical activity and staying physically active all through. The physical and mental well-being of adolescents has a direct bearing on the future of our nation. Nutrition plays a very major role, and it is worth investing in it.

It is also the phase in life when girls become future mothers. Their nutrition can break the intergeneration cycle of malnutrition. Optimal and even above optimal nutrition and physical activity will help them

walk into adulthood and be blessed with good health needed for their future and the new generation they will procreate.

By the time life enters adulthood and thereon into old age, the nutrition interventions or nutritional abuses in early life will start showing their effects on health. It was said that A HEALTHY OLD AGE IS NATURE'S GIFT TO A DISCIPLINED YOUTH.



However, even those who were nutritionally well endowed in early life and in good health may lapse into inactivity when they are past middle age and due to pressures of life, also indulge in undesirable food habits. Self-discipline and moderation in the choice of foods and taking time for moderate physical activity or regular workouts or yoga will maintain healthy lives despite the work and family demands.

Governments and Industry should cooperate in giving the best messages and best foods to keep the burden of disease low

and help everyone pass through this phase of life in good health.

Providing people with a wide range of nutritional options like healthier wholesome natural foods, Fortified foods, low energy, low fat, low saturated fat, low refined carbohydrates, low sugar, whole grains with complex carbs etc and educating through media and sensible product labels are the various options.

While flagging the potentially less healthy foods and discouraging them through information dissemination and strict regulation is a workable solution, it may not provide the desired health benefit unless the community adopts physical activity as a way of life. Innovative ways of enforcing this can be tried through public private partnerships and the media.



There must be a convergence and all of us need to walk this challenging path to lead healthy lives.

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# CAN FOOD LABELS HELP CONSUMERS EAT HEALTHY?

AUTHORS



**SubbaRao M Gavaravarapu,**

Scientist E & Head, Nutrition Information, Communication & Health Education (NICHE) Division ICMR-National Institute of Nutrition, Hyderabad

Unhealthy food choices, faulty dietary practices and imbalanced diets negatively impact the health of an individual. In developing countries, a change in the consumers' food purchasing behaviours have been observed owing to multiple factors like increased per-capita disposable income, globalization, education, urbanization, change in lifestyle, family structure, and health awareness. There is a surge in consumption of pre-packaged foods due to various reasons like safety, convenience, longer shelf life and taste. However, some pre-packaged foods, which undergo tertiary processing or ultra-processing may be high in sugar, salt, saturated fats, trans fats and calories, and thus could



**Priyadarshini S**

Project Scientist B Nutrition Information, Communication & Health Education (NICHE) Division ICMR-National Institute of Nutrition, Hyderabad

have major implications on health when consumed frequently. Dependency on packaged, processed, ready-to-use foods, takeaways and irregular eating patterns are partially blamed for the occurrence of food and lifestyle related diseases like obesity, diabetes and metabolic syndromes.

The worldwide estimate of overweight and obesity among adults is 39% and 13% respectively. India too shows the increasing prevalence of NCDs coupled with sustaining under-nutrition problem resulting in a double-burden of malnutrition. According to ICMR-INDIAB study report (<https://www.ijmr.org.in/article.asp?issn=0971-5916;year=2015;volume=142;issue=2;page=139;epage=150;aulast=Pr>)



**& Sudershan Rao V**

Scientist E (retd), ICMR, National Institute of Nutrition, Hyderabad

is a major public health problem, which negatively impacts the social and economic development.

## Food labels - Food related communication

Currently there is an increasing need for policies that discourage consumers from consuming foods and beverages that are high in fat, sugar, salt and empty calories (and are devoid of protein, fibre or micronutrients) as well as help them make informed food choices. The major determinants of food choices include brand loyalty, health awareness, packing, discounts and offers. Several strategic communication methods are being implemented to generate awareness and motivation among consumers to make healthy choices. Public policy approaches like levying tax on/taxing sugar-sweetened beverages and ultra-processed foods

[adeepa](#)), the prevalence rate of obesity and central obesity varies from 11.8% to 31.3% and 16.9% to 36.3% respectively. NCDs have emerged as one of the leading causes of death globally, with 80% of NCDs related deaths occurring in low and middle-income countries (LMICs). The increasing burden of NCDs



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implemented in some countries to motivate consumers make healthful choices have produced varied results. Nutrition Labels (providing nutrient information on the labels of the packed foods) are an important and promising tool for effective nutrition communication to help consumers make informed and healthy food choices. Nutrition labelling is a population-based approach that provides necessary information about the nutrient contents of the food on its pack. Using the framework of behavioural theories - elaboration likelihood model (ELM) and theory of planned behaviour (TPB) – an individual's effort and intention to engage in label reading have been studied. The results of such studies suggest that to promote nutrition label use, nutrition education should focus on acquiring skills for checking nutrition labels, benefits of using nutrition labels and receiving support from significant others (policy, educators, peers manufacturers etc) for the success of nutrition label use. The elaboration likelihood model (ELM) provides a framework elucidating the influence of consumer's knowledge on food label processing. According to this model information is processed through two ways - one is central route and another is peripheral route.

An individual with prior nutrition knowledge or with high involvement with the topic processes the information through central route because they have the ability to evaluate the information. Peripheral route of processing occurs when an individual makes decision based on peripheral or heuristic/symbol cues and doesn't require much involvement with the topic. Previous studies conducted among Indian population have indicated that consumers could identify symbol-based peripheral cues (such as vegetarian, non-vegetarian,

AGMARK) as they are quick and easy to understand. The result of such studies strongly indicates that more Indian consumers find it easy to access information on food packages through peripheral route. In a diverse country like India where numerous regional languages exist, both functional literacy and nutritional literacy are meagre, symbol-based cues on labels are better choice than written labels.

#### Nutrition labelling - consumer uptake of information

Nutrition labelling comprises of three components - nutrient declarations, nutrition and health claims, and supplementary nutrition information. Studies assessing the utility of food nutrition label have shown that back-of-pack nutrition label with detailed nutrient content information does influence the buying behaviour of consumers. However, the usage of food nutrition label is found only among people with nutrition and health awareness, people intentionally combating their unhealthy food practices, people with disease conditions and aged persons. The barriers to food nutrition label usage reported are lack of time while shopping, numeracy challenges, low nutrition knowledge, confusing terms and units. Less awareness among consumers about nutrition label use or difficulty in understanding the technical nutrient information may result in poor interpretation of labels for making choices.

In India, mandatory Nutrition Fact panel on food product was implemented in 2011, with guidelines provided by FSSAI, with an aim to enhance health and reduce the risk of non-communicable diseases (NCDs). According to the mandatory nutrition labelling, the food packets must carry nutrition information per 100 g or 100 ml of the product, along with other product details. Cross-sectional analysis

of food nutrition label use in Indian cities, points out that the consumers often overlook the nutrition label, and their intended purpose is hardly met. Therefore, there is felt need among the health advocates, public health professionals, and international organizations for additional policies that require front-of pack labelling (FoPL) to provide summary indication about the healthfulness of the foods or FOP warnings on foods high in nutrients of concern – Fats, Sugars and Salts, which are simple and easy to understand and not time consuming.

The Codex Alimentarius Commission, established by the Food and Agriculture Organization (FAO) and the World Health Organization (WHO) have revised their guidelines regarding food labels. Following which several government regulatory bodies in several countries including FSSAI are revising their food labelling regulations to include FOPLs essentially as warning symbols to draw attention of the consumers to nutrients of concern – fats, sugars and salt. FOPL provide additional information to aid the consumers in interpreting quantitative information on nutrients usually provided on the back of packages.

#### Front-of-pack Label (FOPL)

According to CODEX Alimentarius Commission

([http://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FMeetings%252FCX-714-44%252FWD%252Ffl44\\_07e.pdf](http://www.fao.org/fao-who-codexalimentarius/sh-proxy/en/?lnk=1&url=https%253A%252F%252Fworkspace.fao.org%252Fsites%252Fcodex%252FMeetings%252FCX-714-44%252FWD%252Ffl44_07e.pdf))

FOPL is defined as “Symbols/graphic or textual indications that provide simplified nutrition information used on the front or principal display panel of pre-packaged foods”.





FAO/WHO, classified the FoPL symbols as - (a) nutrient-specific food label symbol schemes that inform the consumer about the levels of a specific nutrient in a food item; (b) summary indicator food label symbols which help the consumer differentiate between healthy and unhealthy food items; (c) food group information symbols that inform the consumer about the food groups present in the food item; (d) Hybrids of these three types of symbol scheme.

Based on the consumer understanding of the Front of pack labels (FOPL), it can be broadly classified into interpretive or reductive labels. Interpretive labels can be easily understood by the consumers as it provides simple at-a-glance information for consumers even for those with minimal education and nutrition knowledge, whereas the reductive labels (e.g., Guideline Daily Amounts) provides nutrient information, which needs to be interpreted by the consumers by invoking their latent nutrition knowledge. Interpretive labels can be further categorized into Interpretive nutrient-specific formats (e.g., Multiple traffic lights, warning symbols) and Interpretive summary indicator formats (e.g., Nutri-Score, Health star rating). Interpretive nutrient-specific labels provide information on the individual nutrients within food, whereas interpretive summary indicator provides an overall evaluation of the nutritional quality of the product.

**FOPL use in other countries and its impact on consumer behaviour**  
Countries like Chile, Peru, Uruguay and Israel have implemented mandatory national Front of pack nutrient warning label policy. According to the policy it is

mandatory to indicate high or excess levels of nutrients of concern (frequently referred to as “critical nutrients”), including added sugar, sodium, saturated fat, and in some cases, trans fat, energy or non-caloric sweeteners in the front of food packages. The warnings indications can be shapes, text, or colours intended to signal a warning and to discourage consumption. Some of the FOPL models that are in use across the world include - Traffic light labelling system, Health star food rating system, The Choice Programme Logo, Black hexagon symbol. Types of front-of-pack nutrition labelling system used worldwide are listed in table.

Data from studies assessing the acceptability of FOPL in other countries suggests interpretive labels are easier to use and understand than those providing only numerical information on nutrients (Reductive FOPL). A recent meta-analysis of 114 studies studied the impact of FOP labels on the various attributes of consumer behaviour (<https://link.springer.com/article/10.1007/s11747-019-00663-9>). The results of the meta-analysis suggested that interpretive labels were able to increase the purchase intention of healthy product. The data also suggested that interpretive summary labels are more effective in identifying healthy products more accurately. Studies conducted in the European countries indicate Nutri-Score as the clear front-runner for FOPL. However, it is still unclear whether the positive changes due to FOPL influence consumers eating behaviour.

#### FOPL in the Indian context

Recent data from 2018 study observed that the purchasing frequency of packaged foods have increased from 68% to 84% among Indian consumers within a span of four years. The study also showed the increase in number of people reading the food labels from 40% in 2012 to 76% in 2018, however it was mainly used for information pertaining to brand name, manufacture date, ethical concern

(veg or non-veg), best-before-date. Some of the reasons given by the consumers for not using nutrition label are usage of technical terms, information given not legible and less visibility. This justifies the need to implement FOPL in Indian food environment.

However, there are many challenges present with regard to mandatory FOPL such as low nutrition literacy, high illiteracy among rural population, and low health awareness which needs to be addressed. Previous studies on nutrition label use among Indian population suggests that symbols on food labels (indicating vegetarian and non-vegetarian symbols) have better uptake and recall value. In such a scenario, symbol based FOPL warning symbols can be helpful in motivating, enhancing risk perception and promoting healthy food choices among a large section of the people. As indicated by studies from other countries interpretive summary label would be a better model for Indian population. The advantage of using interpretive summary label would be the inclusion of positive attributes of the packaged foods for evaluating the product healthfulness. This can motivate consumers to choose healthy products.

The Food Safety Standards Authority of India (FSSAI) was considering implementing symbol-based front-of-pack nutrition labelling. In 2018, FSSAI introduced draft regulations for front-of-pack nutrition labelling and made them available to the public online for comments. According to the proposed regulation, if the total amounts of calories, fats, trans-fats, sugar, and sodium per serving exceed the stipulated limits, it would be indicated in red colour.



As per the draft guidelines, following information shall be declared on the front of pack alongside the name of the food; veg or non-veg symbol; per serve contribution of energy, total fat, trans fat, total sugar and salt (sodium chloride) to RDA.

Indicative figure provided below. After feedback and consultation with multiple stakeholder groups, the regulatory body is rethinking on the format.

In the context of co-existence of triple burden of malnutrition with under-nutrition, increasing over-nutrition/obesity related NCDs and micronutrient deficiencies, FOPL can perhaps be effective tool in either discouraging nutrients of concern (High fats, sugar and sodium) or encouraging healthy food choices (by summary value of

food). Although both of them may appear to mean the same, the purposes they serve are slightly different, the public health issues that need to be addressed through FOPL (combating NCDs or promoting Nutrition) should be prioritized.

However, context specific evidence on the effectiveness of these “high content” FoP nutrient warnings or summary indicator labels is needed to inform the ongoing advocacy and regulatory processes in India. A recent review posits a model and suggests that warning labels to be effective, must first grab attention, be accurately understood and thereafter must elicit a negative affect or perception of risk, which in turn should trigger behavioural intentions, and ultimately behaviour change

(<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7071470/>).

The FOPL models developed should be assessed in terms of consumer attitudes and practices related the various attributes such as noticeability, comprehension and cognitive workload, time take to assess the healthfulness of the product, objective understanding, and legibility and purchase intentions. An understanding of the different types of FOPL systems is needed for evaluating their inherent benefits and limitations, their performance or potential performance in the marketplace not only to guide food selection among consumers but also to encourage food reformulation and their design and implementation.

Some Formats Of Front Of Pack Labels In Vogue

Nutrient-specific

Summary Indicative

Food Group Information

Endorsement Logo

Hybrids

Health-Star Rating

Multiple/Single Traffic Light Labelling

Negative Warning Label

# LET'S GET READY TO CELEBRATE **NATIONAL NUTRITION MONTH, 2021**

AUTHOR  
Ms Nikita Mitra,  
Executive Human Nutrition - East Zone  
Domestic Premix Division  
Hexagon Nutrition



ultimately economic growth.

So what are some Common Nutrition Problems in India?

India has been ranked 94th among 107 countries in the [Global Hunger Index 2020](#), and we are way behind than most other developing countries. Malnutrition in young children still remains a dominant public health concern in India. Globally in 2020, 149 million children under the age of 5 years were estimated to be stunted (too short for age), 45 million were estimated to be wasted (too thin for height), and 38.9 million were wither overweight or obese. Fighting malnutrition in all its forms is one of the biggest global health challenges. Women, infants, children and adolescents are all vulnerable to malnutrition. Hence, taking care of nutrition early in life, especially during the first 1000 days of life that is from conception to a child's second birthday ensures the most valuable start in life, with long-term benefits.

The month of September is celebrated in India as the "National Nutrition Month" and is one of the most important events in the Health Sector. Wondering what makes it so important? Well instead of having to dig through the mountains of information available online, let Hexagon Nutrition do the hard work for you.

The National Nutrition Week was first initiated by the members of the American Dietetic Association (now the Academy of Nutrition and Dietetics) in March 1973 with the aim to create nutrition literacy for the public along with the promotion of Nutritionists as a respected profession. In 1982, with the recognition of the National Nutrition Week by the Indian government, the drive for creating nutritional awareness and motivating people gained further momentum. Hence, National Nutrition Week is celebrated every year from 1st September to 7th of September to make people focus on Nutrition for their better health and the month of September is indeed

catered as a National Nutrition Month.

Why do we celebrate National Nutrition Week?

Time and health are the two valuable assets that we don't acknowledge often and only realize their importance once they have been depleted. A healthy lifestyle has become a priority in the quest for meaningful living and now, all the experts can't emphasize enough on the Role of adequate nutrition as the backbone for a healthy lifestyle. Hence, the food and nutrition Board under the ministry of Women and Child Development of the Government of India celebrates National Nutrition Week every year to highlight the significance and role of the right nutrition for the human body. The Government of India takes various initiatives to advocate the importance of a well-balanced nutrition with an objective to create a healthy impact on productivity, individual development and



Let's get ready to celebrate National Nutrition Month, 2021



**Government Initiatives**

Hon'ble Prime Minister Narendra Modi during his "Man Ki Baat" promoted the saying "Yatha Annam Tatha Mannam" which means "Our mental and cerebral development is directly linked to the quality of our food intake" to encourage people to recognize the significance of right nutrition. During this month the "My Gov Portal" launches many quizzes and other fun activities to enable children to participate as well. It is essential that a child learns and imbibes a healthy lifestyle from a young age. Schools can even take initiatives like introducing a Nutrition Monitor just like a class monitor and create a Nutrition Card just like a Report Card to analyze the child's growth and development. The World Health Assembly (WHA) has laid down six nutrition targets for maternal, infant and young child nutrition that form the basis of deciding nutrition-based policies and goals in nations across the world, according to the Global Nutrition Report 2020.

The Government of India from time to time has taken prominent efforts to achieve the nutrition targets for decades now. Let's take a look at some of them in brief:

1. National Nutrition Policy, 1993 National Nutrition Policy was divided into direct strategies (short term) and indirect strategies (long term).



Indirect strategies demanded focus on the following:

- Food safety,
- Advancing the dietary model like giving nutritionally rich food at affordable cost,
- Developing purchasing power, Encouraging more of the small and medium enterprises to rise,
- Restriction of food adulteration,
- Conferring nutrition wisdom through social marketing, communication, etc.,
- Minimum wage administration,
- Equal remuneration for women,
- Monitoring of nutrition programs.

Direct strategies demanded focus on the following:

- Assuring precise nutrition of the target groups i.e. the vulnerable section of the society (children, adolescents, pregnant and nursing women, etc.)
- Developing the safety net for children (i.e. expanding the policy to rural slums along with urban slums) Provisions for low-cost nutrition food, and
- Combating micro-nutrition deficiency in the vulnerable groups
- Food fortification



2. National Nutrition Mission or POSHAN Abhiyan, 2018

It was launched by Prime Minister Narendra Modi in March, 2018 for a multi-ministerial mission to ensure a malnutrition-free India. This is the Center's flagship program aimed at improving the nutritional outcomes for children, pregnant and lactating women so that it can tackle the problem of malnutrition.

3. National Food Security Act, 2013

This Act claims to provide nutritional support to pregnant



women and lactating mothers along with children aged 6 months to 14 yrs. For this, it has started to contribute at least 5 kg of food grains per month at a subsidized price to around 75% of the rural population and 50% of the urban population.

Other prominent Government programs include the:

1. Mid-Day Meal Scheme, 1995: launched by the Government of India to secure more reliable nutrition amongst the school-going children. Here even the Anganwadi workers and helpers, village women and Mahila Samiti work at the grassroots level for all the children of primary schools run by the government or aided by the

government, helping such children with a fully prepared mid-day meal.

2. Special Nutrition Programme, 1970: The Mid-day meal scheme complements this program as it was devoted to providing supplementary feeding of around 300

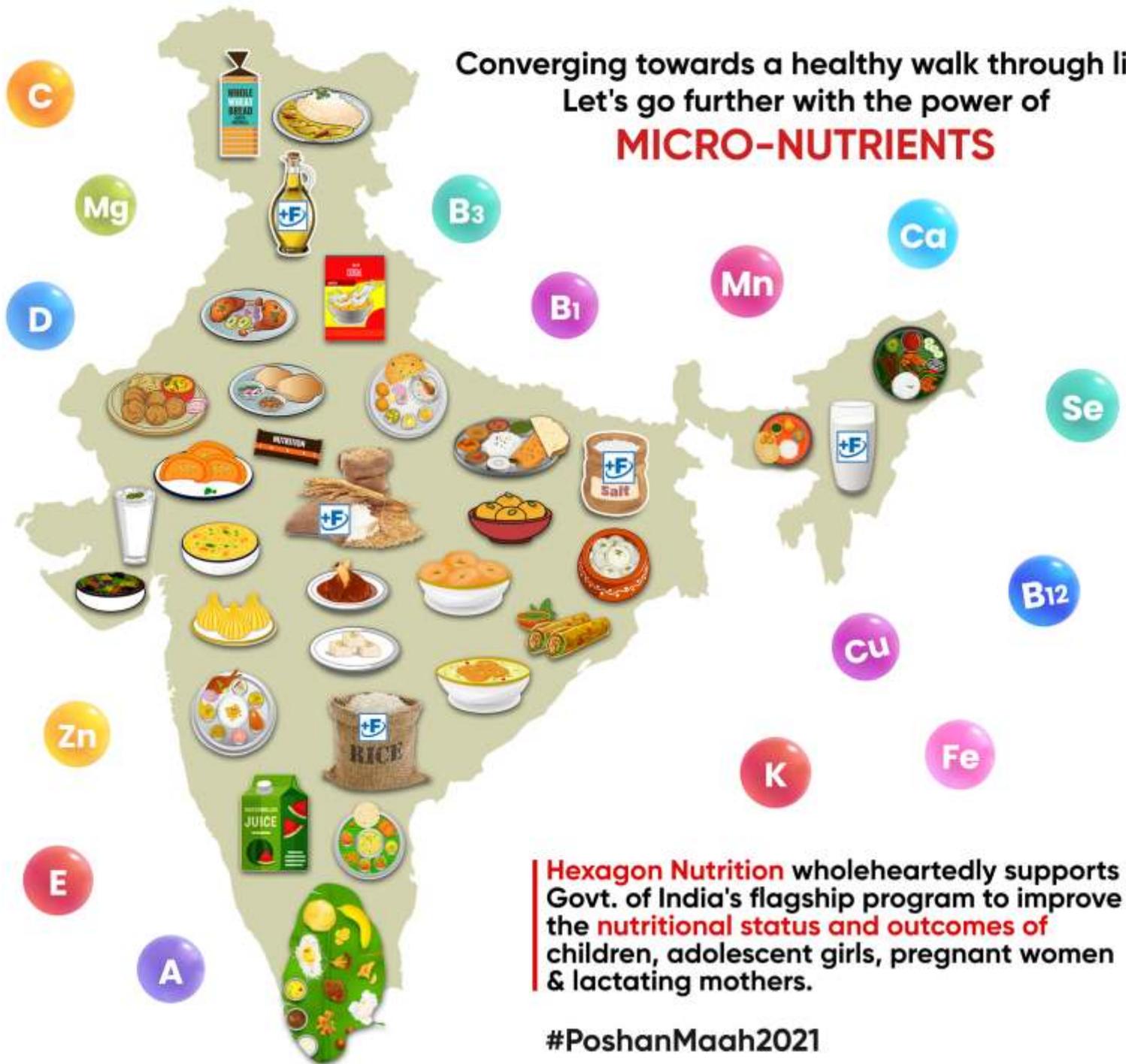
calories and 10 grams of protein to preschool children. It also includes lactating moms, to support them with 500 calories and 25 grams of protein each.

Simultaneous awareness generation on weight management and its importance through the Body Mass Index is curated for adolescent boys and girls held at the village level through puppet shows, skits, dance & drama, films, slide shows, AV Spots, nutrition rallies, etc.



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**Hexagon Nutrition** wholeheartedly supports Govt. of India's flagship program to improve the **nutritional status and outcomes of** children, adolescent girls, pregnant women & lactating mothers.

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www.hexagonnutrition.com  
marketing@hexagonnutrition.com



**Head Office:**

404/A, Global Chambers,  
Off. Link Road, Andheri (West),  
Mumbai- 400 053.



**Contact us at:**

+91 72763 75765  
+91 8097425998

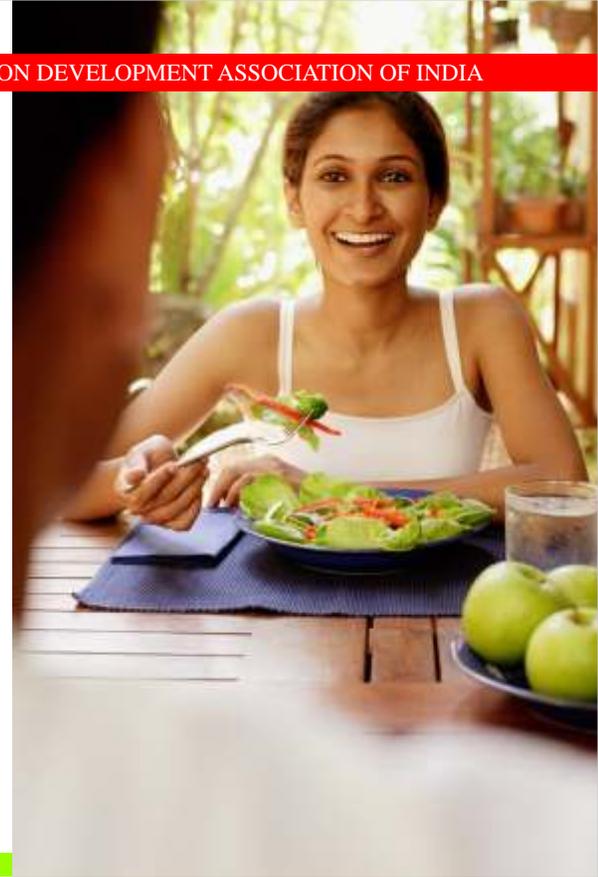
Disclaimer: Above food processing application products are as per FSSAI regulations gazette No. 290- Staple Food Fortification dated 3rd August 2018, gazette No. 552- Processed Food Fortification dated 18th December 2020 and gazette No. 137- Food for Infant Nutrition dated 1st April 2021 respectively.

3. The Food and Nutrition Board of Ministry of Women & Child Development, through its 43 Community Food and Nutrition Extension Units (CFNEUs) located in 30 States/UTs, coordinates with the concerned Department of the State/UT Governments, National Institutions, NGOs to organize State/UT Level Workshops, Orientation Training of Fields Functionaries, Awareness Generation Camps on nutrition.

Apart from the Government, several Activities like Demonstrations, Poster Competitions, Lecture Competitions, Recipe Competitions, Skits, Community activities are also carried out by Educational

Institutions, Hospitals, Nutraceuticals, Local NGOs, etc to create awareness.

Hence, each and every professional associated with the Health industry makes it their mission to promote the importance of nutrition during National Nutrition Month. Hexagon Nutrition, being a prominent front-runner of this industry has always strived to advocate the importance of the right nutrition. Through our noticeable contribution in the area of premises and awareness campaigns, the Hexagon Nutrition Team pledges to continue marching towards a healthy India.



## COMING EVENTS

Fi India & Hi 2021  
Sep 30 - Oct 02, 2021  
Mumbai India  
Web:  
<https://www.figlobal.com/india/en/home.html>  
Contact:  
[Fimarketing@informa.com](mailto:Fimarketing@informa.com)

Vitafoods Europe 2021 (Virtual)  
Oct 04 - 08, 2021  
Digital Format  
Informa UK  
Contact:  
<https://www.vitafoods.eu.com/en/welcome.html>

CPhi Korea 2021  
Oct 11 - 13, 2021  
Seoul, South Korea  
Informa Markets  
Contact: <http://www.hi-korea.net/en/main/main.php>

Future of Food & Nutrition  
24th World Congress on Clinical Nutrition  
Oct 16 - 18, 2021  
Haridwar, India & UK  
Web: [www.ismnworld.org](http://www.ismnworld.org)  
Contact: [ismninfo@gmail.com](mailto:ismninfo@gmail.com)

India Food & Nutrition Innovation Summit 2021  
Oct 27 - 28, 2021  
Thinking Forks & FICCI  
Web: [www.ifnis.in](http://www.ifnis.in)  
Contact: [ifnis@ficci.com](mailto:ifnis@ficci.com)

Fi Europe & Hi Europe 2021  
Nov 30 - Dec 02, 2021  
Frankfurt, Germany  
Informa Markets  
Web: [Fimarketing@informa.com](mailto:Fimarketing@informa.com)  
Contact:  
<https://www.figlobal.com/fieurope/en/home.html>

# RIGHT NUTRITION FOR CHILDREN TO SUPPORT HEALTHY LIFE

**AUTHOR**  
**Dr Swati Shukla,**  
 Associate Manager- Nutritionist,  
 Amway India Enterprise



Nutrition is important at every stage but is more crucial at initial stage as lay down the foundation of health and strength for the growing years. With the changing scenario of working parents, easy access to convenient and appealing snack options and sedentary lifestyle, the nutrition security of children is a topic of major concern.

- As reported by UNICEF, at least 1 in 3 children <5 years of age are under nourished or overweight while 1 in 2 suffers from micronutrient deficiency, globally.
- From 2000-2016, the cases of overweight and obesity has increased from 1 in 10 children (5-19 years) to almost 1 in 5 children.
- As per the report by FAO- UN, 2021, India, in spite being one of the world's largest producer of milk and pulses and second largest producer of rice and wheat, is a home to 30.9 percent of children <5 years with

stunting, 17.3 percent with wasting. Why Nutrition is Important for Children?

If not given proper nutrition, children are more at risk of malnutrition due to following reasons

- Low Nutrition reserves- Since the time of birth to growing stage, the stored reserve of nutrients keep on depleting.
- High rate of growth- During initial years of life, rate of growth is fastest. In fact, infants grow exponentially till 2 years of age, which demands increased nutrients intake.
- Fast pace of cognitive development- Compared to any other time in life, brain grows nearly

to its full capacity of total up to 90% in the first 5 years of life. More than 1 million neural connections are formed per second during initial years.

- Moreover, healthy practices at initial stage helps building the habit of healthy eating and making healthy choices.

Recommended Dietary Allowance- RDA is the level of daily nutrient intake adequate enough to meet the nutritional requirements of a healthy individual. It also incorporates safe margin to prevent any deficiency.

Age group	Category	Protein (gm/d)	Fiber* (gm/d)	Calcium (mg/d)	Iron (mg/d)	Zinc (mg/d)	Folate (µg/d)	Vit B12 (µg/d)	Vit C (mg/d)	Vit A (µg/d)	Vit D (IU/d)
Infants	0-6 months*	8	-	300	-	-	25	1.2	20	350	400
	6-12 months	10.5	-	300	3	2.3	85	1.2	30	350	400
Children	1-3y	12.6	15	500	8	3.3	120	1.2	30	390	600
	4-6y	16	20	550	11	4.5	135	2.2	35	510	600
	7-9y	23	26	650	15	5.9	170	2.2	45	630	600
Boys	10-12 y	32	33	850	16	8.5	220	2.2	55	770	600
Girls	10-12 y	33	30	850	28	8.5	225	2.2	50	790	600

\*Adequate Intake (AI). Source: ICMR, NIN, 2020

Table 2. Five food groups

Food groups	Nutrients
I. Cereals, grains and products (Wheat, rice, rice flakes, suji, etc) Millets like bajra, jowar, ragi	Carbohydrates, Protein, Vitamin B complex, Iron, Folic acid, fibres
II. Pulses and Legumes (Pigeon pea, cow pea, bengal gram, lentils, green gram, kidney beans, beans)	Carbohydrates, protein, Vitamin B complex, fibres, folic acid, calcium, iron
III. Milk and Meat products Milk- curds, paneer, buttermilk, cheese Meat- chicken, seafood, beef, lamb, pork	Protein, fat, Iron, calcium, Vitamin B 2, 12
IV. Fruits and Vegetables Fruits: Mango, guava, papaya, orange, tomato ripe, sapota, apple	Vitamin A, Vitamin C, Fibre
Vegetables (Green leafy): spinach, coriander leaves, fenugreek leaves, mustard leaves, amaranth leaves	Fibre, Iron, carotenoids, iron, folic acid, calcium
Other vegetables: brinjal, radish, carrot, potato, onion, okra, pepper	Fibre, carotenoids, folic acid
V. Fats and sugars Fats: Solid fats like butter, ghee and cooking oils like coconut, sunflower, soyabean oil	Energy, fat, essential fatty acids
Sugar: table sugar, jaggery, honey	Energy

and sports, ensure adequate supply of specific nutrients like protein, fluids, complex carbohydrates, vitamins and minerals.

4. Few situations like eating less, restriction in diet, medical condition or medication, recurring infection and parasitic infestation, following specific diet- can compromise the daily nutrient intake. For example- Vegetarian diet has shown deficiency of vitamin B12, Iron, protein. Indian diet, basically dominated by cereals, is deficient in protein and essential micronutrients. Many studies have demonstrated the loss of essential nutrients like Vitamin C, B-complex and phytonutrients like flavonols upon cooking and processing.

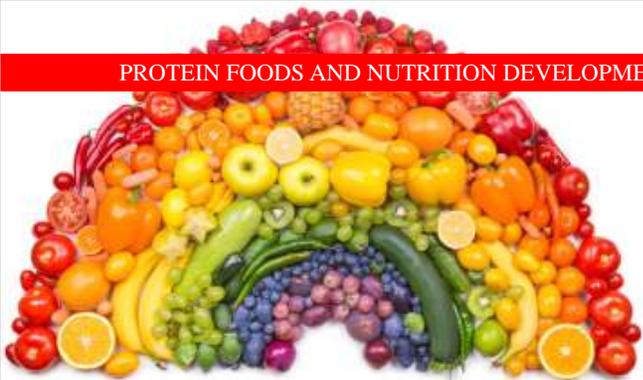
As the child grows from infant to adolescent, RDA also increases to pace up with the increased physical and physiological requirements.

How to meet the required RDA?

1. As suggested by ICMR-NIN, include the five food groups to balance your diet.
2. If child shows disliking towards food, provide small, frequent and nutrient-dense meals.
3. If the child is very active in outdoor games

### Essential Nutrients for Overall Growth and Development

Nutrients	Functions	Sources
Carbohydrates	Principal source of energy to all cells and brain, tissue maintenance and growth, physical activity	Whole grains and cereals, millets
Protein	Building block for growth and development. Precursor to many enzymes, immune cells, hormones and nucleic acid.	Legumes, pulses, dairy, eggs and lean meat, nuts and seeds
Fats	Provide energy, fat soluble vitamins like A, D, E, K, essential fatty acids. Needed for cognitive development, structure of cell membrane, hormones and bile juices.	Liquid oils (at room temperature), nuts and seeds
Fibre	Regulates bowel movement and prevent constipation. Also, acts as prebiotics- maintain gut health by feeding good gut bacteria	Fruits, vegetables, Fiber rich whole grains, cereals and beans
Iron	Important component of hemoglobin and Red Blood Cells to carry oxygen through the body and support mental growth.	Heme sources- Red meat, seafood, poultry and eggs Non-heme- Whole grains cereals, breads, beans and legumes and dark green leafy vegetables
Calcium	Important for strong bones and teeth, proper nerve functioning and muscle contraction	Dairy products, poultry, soy products, millets, seeds and green leafy vegetables
Vitamin A	Crucial for eye health, healthy skin and strong immunity.	Yellow, dark green and orange coloured fruits and vegetables Cheese, milk, eggs and oily fishes
Vitamin D	Crucial for strong bones and teeth and aids healthy immunity.	Sunlight Foods like oily fish (mackerel, salmon, tuna), egg yolks, fish liver oils, cheese
Zinc	Growth and development, Support cognitive health and immunity	Whole grains, dairy, chickpeas, nuts, oysters, mushrooms
Probiotics	Support healthy microbiota, gut health, immunity and brain health	Curd, buttermilk, cottage cheese, sourdough bread



Studies have shown that supplementation plays an important role in bridging this nutrition gap and supports overall health and development with improved physical and psychological performance. Therefore, can be given to children post expert's advice.

**Kid's healthy Eating Plate:**

- Designed by ICMR, focus on sourcing macro and micronutrients from minimum 8 servings of fruits and vegetable (F&V) per day-occupies half of the recommended plate
- Rest half of the plate is covered by one-fourth of cereals and grains and one-fourth by protein sources.
- The glass alongside the model plate represents milk and products like curds, buttermilk.
- In context of calorie contribution, 50-60% of total calories should come from carbohydrates, 10-15% from protein and 20-30% from fat.



Source: ICMR-NIN

**Significance of the Half Healthy Plate-** Studies have shown that 60-87% of people globally fall short of meeting the recommended servings of F&V. These are rich in phytonutrients that impart to it the colour and support human health.

- a. Red F&V like tomato, guava, cherries contain Lycopene- good for heart
- b. Orange F&V like carrot, sweet potato, papaya contains Carotene, Flavonoids- good for immunity, bones and teeth, vision
- c. Green and yellow F&V like leafy vegetables, cabbage, kiwi contains Lutein, Chlorophyll- good for healthy eyes, bones and teeth
- d. Blue F&V like blue grapes, blueberries, eggplant contain Anthocyanins- good for heart and brain health
- e. White F&V like cauliflower, radish contains Quercetin- good for heart, bones and joint health

**Guide to Healthy Diet- Foods to Include and Avoid**

Including variety of foods in diet makes it exciting and flavourful. Also, it balances the meal as each has unique set of essential macro and micronutrients.

1. Include seasonal and variety of colourful fruits and vegetables. The more the variety, the better. Prefer whole or sliced fruits and vegetables or smoothies with pulp.

Avoid- Processed form like fruit juices or candied fruits, fries, jams, marmalade, as they have negative impact on blood sugar and cholesterol levels.

2. Prefer whole grains like whole wheat flour, broken wheat (daliya), semolina, brown rice, millets like ragi, bajra, jowar, quinoa or products made with the same.

Avoid- Refined cereals like maida, white rice, white bread, noodles made with refined wheat flour, etc.

3. Include protein rich sources as mentioned earlier. Focus on plant-based proteins like derived from soy, pea, quinoa, chia seeds, nuts, sprouts, lentils, etc. These provide advantage of supplying other nutrients like fibre, zinc, iron, omega-3 fats, etc along with benefits of low in calorie, supporting heart,

immunity, gut and brain health. Avoid- Red meats like beef, lamb or processed/flavoured dairy products like flavoured yogurt and milk as contain high amount of preservatives and sugar.

4. Fat in diet is an essential component but the quality of fat matters the most. Include good fats rich in Monounsaturated fatty acids (MUFA) and Polyunsaturated fatty acids (PUFA) like sunflower oil, canola oil, safflower oil, olive oil, or as present in nuts and seeds like almonds, walnut, pumpkin seeds, sunflower seeds, etc.

Avoid- Use of hydrogenated fats like butter, margarine, mayonnaise, vanaspati and trans-fats present in baked and fried foods.

5. Water- Should be the go-to option with every snack and meal to quench your thirst. It keeps one hydrated and active.

Avoid- High calories juice, sodas and other packaged drinks, which are high in preservatives and sugar and are detrimental for health.

**Nutrition in different stages**

1. Feeding the New born- (1-6 months)- Exclusive breastfeeding is recommended. While the mother is responsible for what to give (Breast milk or formula), baby, by reflex, takes care of how much to take and how fast.

Mother's milk has more digestible protein (whey protein), essential fatty acids and anti-infective agents to help in body's growth and development, efficient brain development and strengthen immunity of the newborn.



## COMMON NUTRITION CHALLENGES & SOLUTIONS

 TODDLERS	 SCHOOL GOING	 ADOLESCENT
<p>Infants and toddlers- Kids are fussy eaters, refused to eat and eat very less</p> <p><b>Consequences</b></p> <p>Cause delay in growth and achievement of milestones with difficulty in catch-up growth</p> <p><b>Solution</b></p> <p>Introduce relaxed feeding environment, add variety or something new in the meal, focus on frequent small portions.</p>	<p>School going children- Kids do not finish and bring back the packed lunch</p> <p><b>Consequences</b></p> <p>Large meal gap leads to lethargy, less attentiveness, deficiency disorders like anemia, low immunity.</p> <p><b>Solution</b></p> <p>Avoid over packing, pack easy-to-eat, nutrient-dense options like paneer vegetable roll, sprouts roll, spinach corn sandwich, etc.</p>	<p>Adolescents- Conjoint issues of growth spurt, peer impact and stress from physical and physiological changes.</p> <p><b>Consequences</b></p> <p>Adolescents inclined to extreme eating pattern- overeating or diet restriction. Health complications associated to overweight and/or obesity and deficiency disorders are seen.</p> <p><b>Solution</b></p> <p>Lifestyle and behavioural modification approach- focus on balanced diet along with physical activity and stress management.</p>

Majorly 50% of total dietary energy comes from fat from breast milk and is the main source of energy.

**Colostrum-** The first milk produced in the first few days after delivery. It is rich in immunoglobulins and white blood cells (to provide immunity), growth factors- to help mature intestinal function, prevent allergy and intolerance and Vitamin A- to provide immunity. Also rich in stool softening agents that helps regularising the bowel movement.

2. Introducing complementary food (6-12 months)- Though breast milk remains the major source of energy and nutrients, introducing solid foods after 6 months is recommended.

Introduce options like dilute cereal porridge, pureed fruits, vegetables, dal water, gradually one at a time so that baby get familiar with new tastes and textures. A baby can have half cup of food 3-4 times a day with a healthy snack. To start with, the texture should be soft with thinner consistency as you slowly can transit towards thicker and lumpier versions. With introduction of complementary food, fat is overtaken by carbohydrate as the principal source of energy and

together with fat, provide energy for growth and development of the infant.

3. Feeding at 1-2 years- The infant can now have food like the rest of the family. Its right time to introduce solid foods including major meals and snacks. Child can have three-fourth to 1 cup of solid food 3-4 times a day along with snacks 2 times a day.

Along with this, continue breast-feeding as long as child wants till 2 years of age. Give healthy snacks like nuts, fresh fruits, vegetables. Avoid junk and processed foods like chips, cookies, fruit juices, cakes, etc.

4. Feeding at 3-5 years and onwards- As the child's growth continues, he relies more on external nutrition. With fast pace of growth, there is an increased demand of energy, protein, essential fats and even micronutrients like Iron, zinc, vitamins, calcium, iodine, etc.

5. Pre pubertal and Pubertal stage- A dynamic phase of physical, psychological, physiological and emotional transformation, nutrition is one the major factor affecting the pubertal development. With growth spurt, there is an increased demand of energy, protein, iron, calcium, zinc and folate.

**Practices: Health Buster vs Health Booster**

1. Avoid over feeding- Do not emphasize on 'clean your plate' concept initially. Over feeding may cause child's aversion from food and disliking towards mealtime. Let them explore and eat as much as they want.
2. Stocking up kitchen shelves- Do not stuff the cabinets with processed snacks and beverages. Stock up with healthy options which are within reach and at eye levels like nuts, seeds, rice flakes mix, whole grain crackers, nut butter, etc.
3. Avoid indulgent feeding- Some parents tend to feed their child in response to negative emotions like calm, distraction, comfort. This teaches child to eat irrespective of appetite and emotional eating. Focus on and build habit of proper meal timings as and when body requires.
4. Response to neophobia- rejection of unfamiliar foods- Child sometimes tend to reject any new food being introduced and parents avoid giving that food assuming he dislikes. Promote repeated neutral exposure to healthy foods and provide variety.



**FACTS:**

Do you know that a 1-year old child needs as much calcium as a 60-year old moderately active man?

Eating junk food alters the brain activity in a way similar to addictive drugs like cocaine or heroine

Children aged 6-23 months can suffer lifelong consequences if they eat unhealthy diets rich in calories but poor in nutrients.

During the first 2 years of life, up to 75% of each meal goes into baby's brain development!

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**ESSENTIAL NUTRIENTS**  
 FOR OVERALL GROWTH AND DEVELOPMENT FROM HEAD TO TOE

Organ/System	Key Nutrients	Food Sources
<b>BRAIN</b>	Omega-3 fats, choline, Folic acid, Vitamin B12, Zinc, Iron, Iodine	Fatty fish, eggs, leafy greens, whole grains, iodized salt
<b>EYES</b>	Lutein and zeaxanthin (carotenoids), Zinc, essential fatty acids	Leafy greens, eggs, fish, nuts, seeds
<b>SKINS AND HAIR</b>	Protein, Biotin, Vitamin C, Vitamin A	Meat, dairy, fruits, vegetables, eggs
<b>MUSCLES</b>	Protein, potassium, calcium, magnesium	Meat, dairy, fruits, vegetables, whole grains
<b>TEETH AND BONES</b>	Calcium, Phosphorus, Vitamin C	Dairy, leafy greens, citrus fruits
<b>HEART</b>	Omega-3 fats, magnesium, calcium	Fatty fish, nuts, seeds, dairy
<b>RESPIRATORY SYSTEM</b>	Omega-3 fats, Zinc, Iron, Vitamin C, D, E, magnesium	Fatty fish, nuts, seeds, dairy, fruits
<b>DIGESTION SYSTEM</b>	Probiotics, Prebiotics	Yogurt, kefir, fermented foods, fiber-rich foods
<b>IMMUNITY SYSTEM</b>	Protein, Vitamin C, D, Zinc, Antioxidants, Prebiotics	Meat, dairy, fruits, vegetables, fermented foods

# FRUCTOOLIGOSACCHARIDE: THE SWEET FIBER

AUTHOR

Dr. Malathy Venkatesan,  
Senior Scientist,  
Tata Chemicals Ltd,  
Innovation Center, Pune.  
(Email [mvenkatesan@tatachemicals.com](mailto:mvenkatesan@tatachemicals.com))



**Introduction:**

Fructooligosaccharide or FOS in short form is an oligosaccharide of fructose as the name suggests. The term “oligosaccharide” refers to a short chain of sugar molecules (“oligo” means “few” and “saccharide” means “sugar”). Fructo-oligosaccharides (FOS) and inulin, which are found in many vegetables, consist of chains of fructose molecules. FOS is a common name for fructose oligomers, mainly composed of kestose, nystose, and kestopentose, in which fructosyl units are bound by a  $\beta$ -linkage at the position of sucrose and in which the degree of polymerization is less than 5. (Fig 1).

When such oligosaccharides are consumed, the undigested portion serves as food for “friendly” bacteria, also called probiotics such as Bifidobacteria and Lactobacillus species. These oligosaccharides can thus be called “prebiotics”. Probiotic microorganisms grow on prebiotics and provide health benefits via production of short chain fatty acids (SCFA). Short chain FOS (ScFOS) are more efficient in producing healthy short chain fatty acids.

the most beneficial in terms of colonic health and has a role as an anti-inflammatory agent. Butyrate is considered to be a key nutrient determining the metabolic activity and growth of colonocytes and may function as a primary protective factor against colon cancer and ulcerative colitis.

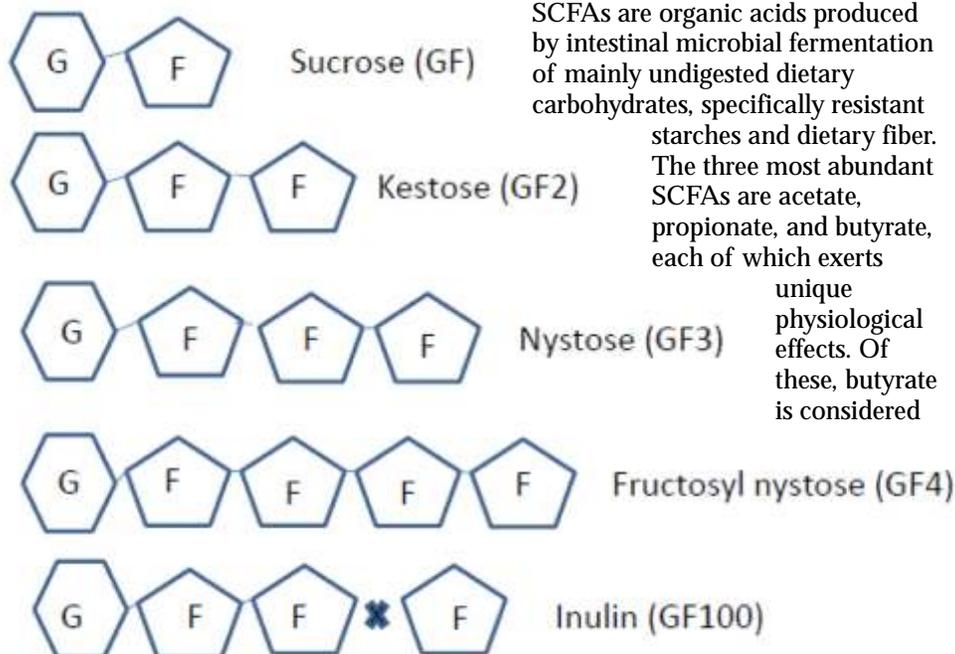
SCFAs also help regulate sodium and water absorption, and can enhance absorption of calcium and other minerals. In addition, SCFAs act to lower colonic pH, which can inhibit growth of potential pathogens and promote the growth of beneficial bacteria such as Bifidobacteria and Lactobacilli.

SCFAs are organic acids produced by intestinal microbial fermentation of mainly undigested dietary carbohydrates, specifically resistant

starches and dietary fiber. The three most abundant SCFAs are acetate, propionate, and butyrate, each of which exerts

unique physiological effects. Of these, butyrate is considered

Different fibers vary in the amounts and ratio of SCFA produced by probiotics, as well as in the rate of production. Fermentation pattern may be related to the molecular weight, chain length, and structure of the fiber. Short chain molecules, such as FOS, are generally fermented more rapidly than larger, longer chain fiber molecules such as acacia gum and PHGG. Fibers that are fermented quickly may lead to excessive gas production and bloating, so dose is an important consideration. In practice, user concentrations of prebiotics (typically 2-4 g/serving) are far below the amounts at which intestinal discomfort occurs. Moreover, it is hypothesized that the prebiotic-induced increase in Bifidobacteria may reduce these



# FOSSENCE®

Short Chain Fructo-oligosaccharide

## The Versatile Prebiotic Dietary Fiber



### Good for Gut

Promotes growth of beneficial bacteria in the gut.



### Reduce or Replace Sugar

Partially replaces sugar calorie load\*



### Good Humectant

Traps moisture well and keeps the internal matrix soft & chewy.



### Binding Agent

Acts as a good binding agent to improve firmness & volume hold.



### Richer mouthfeel\*

Enhances texture and works synergistically with gums to improve viscosity.



### Sensorial Enhancer\*

Helps in masking off-notes and bitter taste.



### Retains Softness Better

(e.g. bread, muffins) is softer over time.



### Easy to use

100% water soluble & readily dispersible.



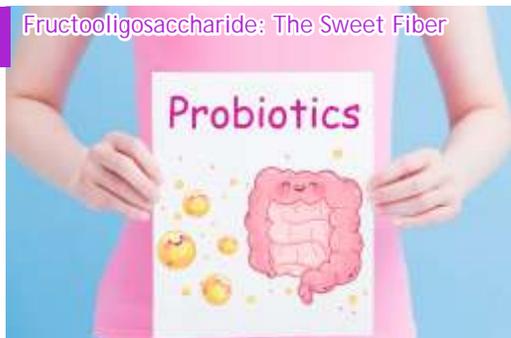
\* Works well in combination with polyols & other sweeteners for No Added Sugar product recipes.

\* Chocolate and curd as the products.

\* With perspective of off taste.

Image for representation purpose only.

Contact us:



adverse effects, because this genus does not produce gas as part of its metabolism.

**How does FOS help as wellness food?**

FOS has a number of interesting properties, including a low sweetness intensity, non-cariogenic and are considered as soluble dietary fiber. The energy value of nondigestible oligosaccharides has been estimated between 1 and 2 kcal/g. Currently FOS are increasingly included in food products and infant formulas due to their prebiotic effect stimulate the growth of nonpathogenic intestinal microflora.

Some mechanisms by which the intestinal microbiota induce these have been suggested:

- 1) Increasing the colonization of favorable bacteria in the colon to compete with pathogenic microorganisms for ecological niches and metabolic substrates. The intestinal microbiota salvages energy through fermentation of substrates not digested in the upper gut. The main substrates are dietary carbohydrates that escape digestion or absorption in the upper GI tract. These include resistant starch, nonstarch polysaccharides (e.g., celluloses, hemicelluloses, pectins, and gums), nondigestible oligosaccharides, and sugar alcohols
- 2) Health benefits via production of SCFAs: Synthesis of energy for cells of the gut wall through the

fermentation of carbohydrates to SCFA, mainly butyrate, acetate, and propionate. SCFA are water soluble and are absorbed into the blood stream. Fermentation and SCFA production are also thought to inhibit the growth of pathogenic organisms by reducing luminal pH

- 3) Modulating the immune system, especially the gut-associated lymphoid tissue (GALT). Modulating aspects of the immune system may, in theory, serve several clinical purposes. First, resistance against infections. Secondly, preventing or treating consequences of an aberrant or undesired immune response, such as those occurring with an allergic response or during chronic inflammatory diseases,
- 4) Modulating gene expression and cell differentiation in the gut wall, including endocrine L-cells in the colon. Glucagon-like peptide 1 (GLP-1) is secreted predominantly from L cells in the ileum and colon and released as an incretin hormone in response to enteral nutrient exposure. The synergistic actions of GLP-1 in the gut and brain seem to be responsible for satiety.

**Natural sources of FOS**

Asparagus, sugar beet, garlic, chicory, onion, Jerusalem artichoke, wheat, honey, banana, barley, tomato and rye are special sources of Fructo oligosaccharides (Fig 2)

Although they are available in several natural food sources, their concentration is relatively low and

limited by seasonal variations. In addition these foods are not consumed in significant quantities or regularly so as to give health benefit to the consumer. The amount of FOS needed to maintain healthy gut microbiota has been determined at 2–2.5 g/day.

● **Production of FOS**

Large-scale ScFOS production is possible using different industrial processes: inulin hydrolysis (enzymatic or chemical hydrolysis of inulin) or sucrose biotransformation by transfructosylation (enzymatic synthesis from sucrose) using specific enzymes like fructosyltransferases and fructofuranosidases. Enzymatic ScFOS synthesis seems to be more advantageous than inulin hydrolysis since it is less expensive, and leads to lower molecular weight FOS.

● **Manufacture of FOS by hydrolysis of inulin**

The inulin and oligofructose available in the industrial food ingredient market is obtained either from sucrose or by extraction from chicory roots. The roots of chicory contain around 15%–20% inulin and 5%–10% of oligofructose. Extraction from chicory roots involves a primary washing after which they are harvested and sliced. This is followed by a hot-water diffusion process and subsequent purification and drying.

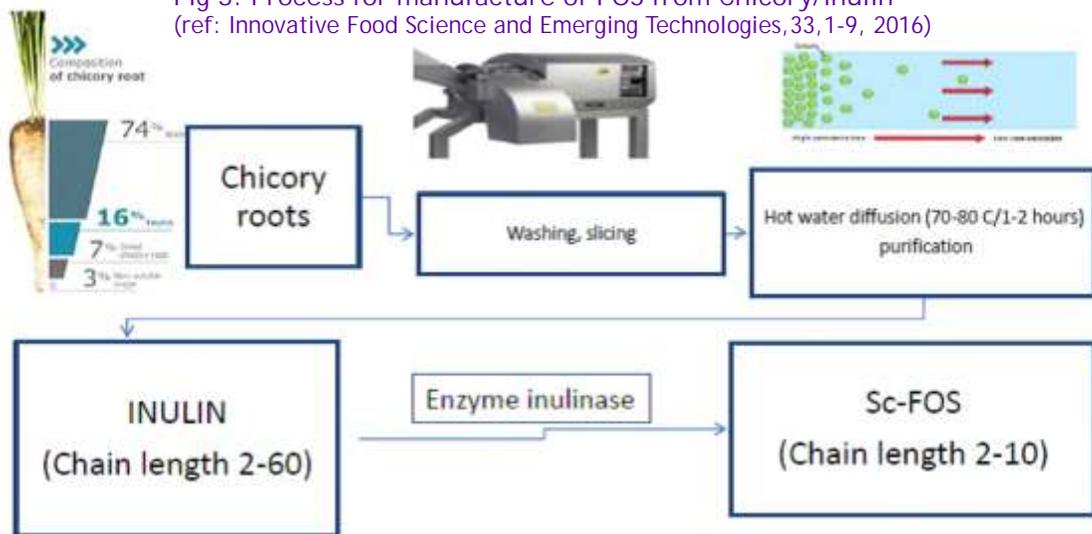
Fig 2: Natural sources of FOS and concentration %

Food source	Type	Concentration%	Intake g/day
Asparagus	Inulin	13-18	1.3-1.8
Chicory	Inulin	15-20	0.75-1.0
Garlic	FOS	0.2	0.002
Onion	FOS	2.8	0.2
Tomato	FOS	1.8	0.2
Rye	FOS	0.7	0.35
Banana	FOS	0.3	0.3 (100-200g of fruit)

(ref: Role of Materials Science in Food Bioengineering <http://dx.doi.org/10.1016/B978-0-12-811448-3.00014-0>)



Fig 3: Process for manufacture of FOS from Chicory/inulin  
(ref: Innovative Food Science and Emerging Technologies,33,1-9, 2016)



The product thus obtained has a DP of around 10–12, a chain length ranging from 2 to 60 and 6%–10% of sugars comprising glucose, fructose, and sucrose.

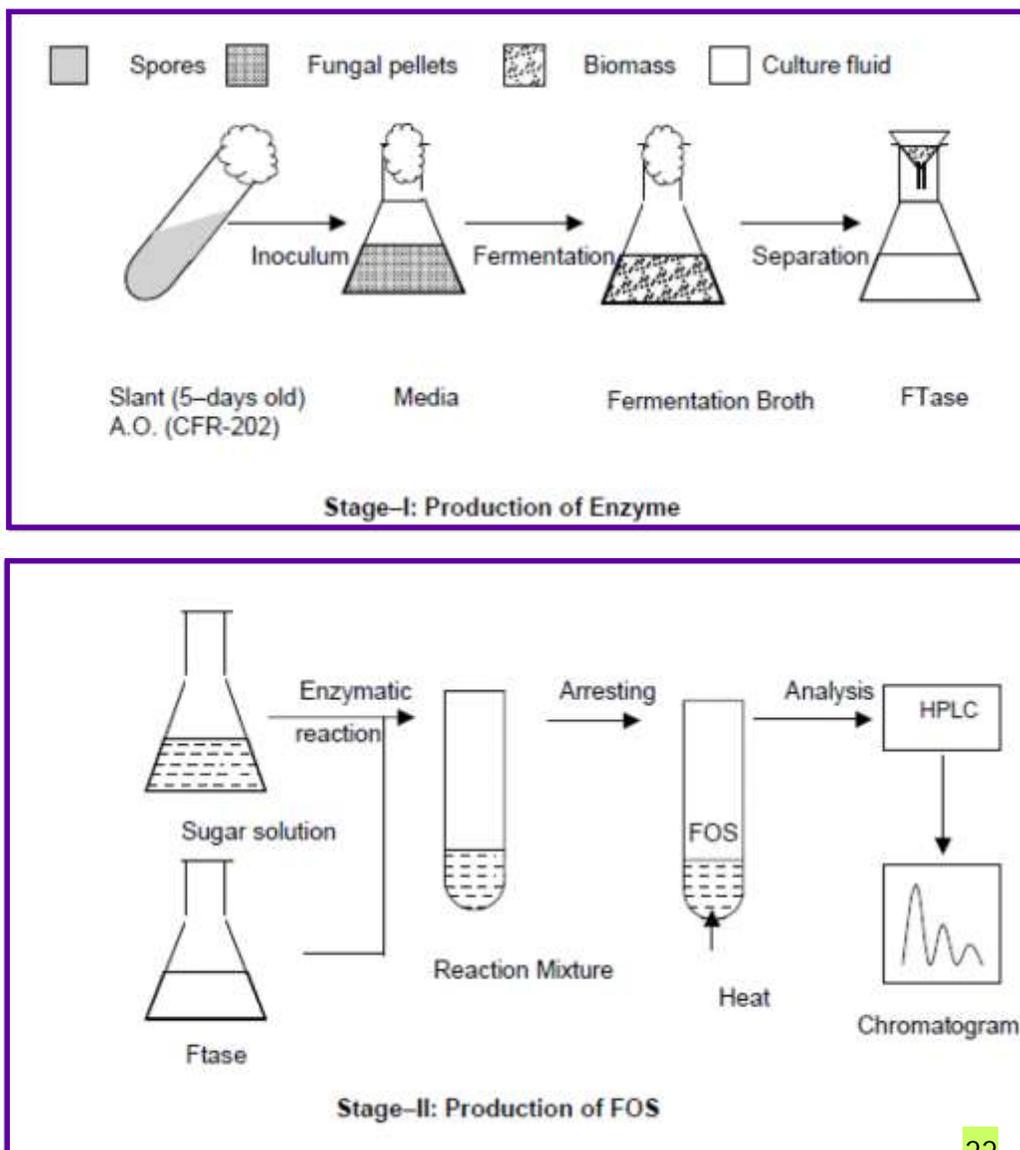
The inulin polymer obtained from chicory can either be used in food systems or it is broken down by enzymatic hydrolysis using inulinase. This process generates oligosaccharides of chain lengths ranging from 2 to 10 with an average DP (degree of polymerization) of around 4. The FOS thus produced has around 30% of the sweetness of sucrose and contain 2–4 fructose units with a terminal glucose residue. By-products, such as glucose, fructose, and any traces of unreacted sucrose can be removed by chromatography.

- Synthesis from sucrose using enzyme (Fructosyltransferases) Fructosyltransferases bring about the transfer of the fructosyl unit of sucrose to different acceptors (sucrose or FOS), producing fructans with different molecular weights depending on the specificity of the enzyme. The action of fructosyltransferases results in a mixture of short chain FOS such as 1-kestose (GF2), nystose (GF3), and fructofuranosyl nystose (GF4). Production is usually in two stages with production of enzyme as stage 1 followed by biotransformation of sucrose as stage 2. (fig 4).The FOS is then separated from the reaction mixture and purified to 95% purity.

In Asia, the mass production of FOS is carried out by the transfructosylation of sucrose in a reaction catalyzed by  $\beta$ -

fructofuranosidase, yielding a product having 50%–60% FOS as the major component, with 30%–40% glucose and 10%–20% sucrose as the other components. Some companies that are well-known producers of FOS from sucrose include Beghin-Meiji Industries, France (Actilight), Cheil Foods and Chemicals Inc., Korea (Oligo-Sugar), GTC Nutrition, USA (Nutra-Flora), Meiji Seika Kaisha Ltd., Japan (Meiologo), and Victory Biology Engineering, Ltd., China (Prebiovis ScFOS). In India Tata Chemicals Ltd has a production facility for Sc FOS (Brand name: Fossence).

Fig 4: Process for manufacture of Sc-FOS from Sucrose  
(ref: Trends in Food Science & Technology 16, pg 442-457 (2005))



Companies that produce FOS from inulin include Orafit Active Food Ingredients, USA (Raftilose), Beneo-Orafit, Belgium (Orafit), Cosuera Group Warcoing, Belgium (Fibrulose), Jarrow Formulas, USA (Inulin FOS). The tremendous ongoing developments in industrial enzymatic processes have made the large-scale microbial production of FOS feasible.

#### Food application of FOS

FOS has sweetening profile and water retention properties similar to those of sucrose and sorbitol. Oligofructose and FOS often serve as sweeteners, replacing sugar either in part or completely. The dosage of 3% FOS in sweetener will give the consumer at least 0.6-1g FOS daily over a longer period of time so as to give sustained health benefits.

FOS is stable at low pH and heat stable up to 140°C. On account of their favorable properties, such as improving moisture retention, texture and shelf life, they find applications in dairy products, frozen desserts, baked goods, fruit preparations, dietetic products, and meal replacers. The percentage of FOS in these products ranges from 2% to 50%. Food products that also contain FOS include biscuits, yogurt, ice cream, cakes, and beef sausages. FOS fortified fruit beverages was acceptable up to 4 and 6 months of storage at ambient or refrigerated storage.

Although FOS can be used for either its nutritional advantages or technological properties, they are often applied for a dual benefit: an improved organoleptic quality and a better-balanced nutritional composition. The physicochemical properties of FOS enriched cookies were studied and a reduction in the breaking strength was observed as the FOS was added as a sugar substitute from 40–80%. The addition of FOS resulted in an increase in dough elasticity and increased its stability.

The effect of FOS on the hydration

and retrogradation properties of wheat starch and gel depended on the content of FOS in the mixture. FOS significantly affected the melting enthalpy of wheat starch and the melting enthalpy of sample with FOS decreased by 9.9 J/g. In addition, FOS could enlarge the freezing scope of the wheat starch gel. According to FT-IR analysis, SEM and XRD results illustrated that FOS could greatly interfere the retrogradation of wheat starch gel. Presumably, the addition of FOS affects the water uptake ability of wheat starch.

#### Synbiotic food

In 1995, Gibson and Roberfroid introduced the term “synbiotic” to describe a combination of synergistically acting probiotics and prebiotics. As the word “synbiotic” implies synergy, the term is usually used for those products in which a prebiotic component selectively favours a probiotic microorganism. The principal purpose of the combination is the improvement of survival of probiotic microorganisms in the gastrointestinal tract.

Therefore, an appropriate combination of both components in a single product should ensure a superior effect, compared to the activity of the probiotic or prebiotic alone. Formulation of food products with a combination of probiotics and prebiotics may impart therapeutic advantages in addition to processing and physicochemical advantages. In a study, results showed that melting postponed, and the apparent viscosity ( $\mu_{app}$ ) was increased for synbiotic ice creams formulated with fructooligosaccharides.

Developed synbiotic soy fermented milk showed more than the 9 log cfu/ml count throughout storage

which is required for probiotic functional food. Addition of FOS in symbiotic soy milk significantly enhanced the acidification rate and condensed the fermentation completion time. The product with FOS had better textural properties with firmer gel, and higher overall acceptability scores on a 9-point hedonic scale.

FOS is notified as GRAS (Generally Regarded as Safe) by USFDA (<https://www.fda.gov/media/97042/download>) is approved by FSSAI as a prebiotic and dietary fiber. Fructooligosaccharides (FOS) are gaining tremendous importance as functional food ingredients in view of their multifarious health benefits and pharmaceutical applications. This sweet fiber can be used in many Indian foods for its functional benefits and as a result improve wellness of the food.

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# ARE FROZEN FRUITS & VEGETABLES REALLY HEALTHY?

**AUTHOR**  
**Prof. Jagadish Pai,**  
 Executive Director,  
 PFNDAI



Indian food & grocery market has changed tremendously over the last decade or two. Frozen foods were very few and included only ice creams and vegetables like peas and corn. Much of the frozen food was in B2B and very little in retail market. Things have changed today and when you go to a large supermarket in the frozen section, you not only find raw uncooked foods including vegetables but also meat, fish and poultry. Further, there are many convenient foods which are ready to cook, needing only either cooking in over or frying. A large number of snack items have emerged in this segment. Going further ready meals are now available which only need heating not to cook but to make it suitable for eating at right temperature.

**Market for Frozen Foods**  
 Indian frozen food market is around \$1 billion and is expected to reach about \$3 billion in five years by one estimate. This is still very tiny compared to the global frozen food market which is from \$200 to 300 billion. However, the rate at which Indian market is growing is around a very healthy 17%. The current pandemic has created a sense of safety among the consumers and frozen foods whether plant foods or animal foods are having a safety intrinsic in their processes. This added to the convenience, has made

it very appealing to people.

Frozen vegetables could be procured and prepared at home very conveniently with minimal wastage as these are already trimmed to remove the parts considered inedible. Thus in value they are quite inexpensive compared to fresh vegetables that are bought in retail shops. As fresh vegetables are very perishable and need to be consumed soon, this is not a problem with frozen which have a shelf life of several months. Since most homes have refrigerators, storage is not difficult. People only wonder if frozen are nutritious and if they could be part of the balanced diet.

### Why freezing?

Vegetables are perishable commodities. If kept long under ambient conditions will lose sensory and nutritive quality along with microbial and enzymatic changes causing spoilage. The enzymes and microbes need water as well as mild temperature for their activity and growth. If the vegetables are dried or if they are kept at very low temperature, the activity of enzymes and microbes is curtailed and

spoilage is slowed down. If temperature is kept sufficiently low, they could be kept without spoilage for long time.

Refrigerator temperature is between 4 and 10°C. This slows down the activity of microbes and enzymes. Freezers are well below 0°C and commercial freezers are ideally kept at -18°C at which microbial activity slows down and almost stops. However, even at that temperature after several months some activity may be evident especially enzymes. There may be changes in colour and flavour over months of storage. Some losses will also occur in nutrients. These could be further minimised by blanching treatment to not only reduce the load of microbes but also deactivate enzymes.

### Harvest, Transport & Storage of Fruits & Vegetables

The advantage of frozen fruits and vegetables starts from the harvest itself. As fruits and many vegetables soften when they ripen and are ready for eating. Fresh fruits and vegetables are among the healthiest foods one can eat.





They contain vitamins, minerals and antioxidants, which can improve health. However, unlike in the past, the growing areas are far away from the consumption areas, which are now mostly cities. Thus, they need to be transported and stored in warehouses before they can finally reach the consumer markets. On the way, there is a likelihood of a lot of damage mostly mechanical and overripening and spoilage. So farmers harvest them when are still slightly unripe before they reach the peak of their ripe quality. At this stage they are still hard and can resist mechanical damage. So, their nutritive values are also not the highest.

Frozen fruits and vegetables on the other hand are harvested when they reach the peak of their quality with highest nutrient contents. Most freezing plants are situated near the growing area so they could be quickly sent to the factories and frozen. Thus, there are higher nutrients while harvesting and since there is hardly any time lag it protects most of the nutrients even after freezing.

Fresh fruits and vegetables on the other hand have to be shipped over large distances in ambient conditions and this allows large losses of nutrients. It takes several days to several weeks for them to reach markets from farms. Frozen fruits and vegetables on the other hand can be stored under frozen conditions for months and there

may be lesser losses.

#### Other benefits

Fruits and vegetables are seasonal so are only available in fresh form during season. Frozen on the other hand may be available sometimes throughout the year as they have shelf life of several months to more than a year. Favourite ones could be consumed anytime during the year. Most frozen fruits and vegetables are commonly prepared to remove inedible portions such as peels and pits or stones. The vegetables are also washed and cleaned of dirt and cut before freezing so they are ready for use after thawing. It

saves a lot of time and efforts in preparation of food.



There is downside to freezing also in some cases. When frozen the water in food changes to ice which is not only hard but also has higher volume than water. Hence, there is a likelihood of cells and tissues being disintegrated especially when there is plenty of moisture in food. Tomato or watermelon for example is not frozen as while freezing the tissues will be badly disintegrated and after thawing, it will be mushy and not retain any shape. Larger ice crystals are also formed when freezing process is very slow.

#### Freezing of Foods

As mentioned above as the temperature is lowered, the activity of microbes and

enzymes become slower and almost stops at very low temperature. This happens without the need of preservatives. Lowering of temperature can be done by different means.

In some cases, ice may be used to lower the temperature. This may be done to lower initial temperature rapidly after harvest. This is done commonly for fish, which is iced as soon as it is caught. Fish can spoil very quickly if held at ambient temperature too long. Even in case of vegetables and fruits as they may be respiring and producing heat it would be better to quickly lower temperature so the respiration rate and related changes are slowed down. Second reason for using ice may be in case the place of harvest may not have cooling or freezing facilities then icing is the best alternative. Commonly icing is used as preliminary cooling process.

Freezing is done in room cooling where cold air is allowed in after produce is placed on racks. As cold air exchanges heat with produce, it becomes warmer and has to be replaced by fresh colder air. Also, as it becomes warmer it picks up moisture from food so there is a possibility of loss of moisture and damage to produce. It either needs to be protected by packing or moisture content of air should be controlled so it does not pick up much moisture.



Contact freezing can be done by keeping produce on racks or plates which are cooled from inside by refrigerant so only cold plates come in contact with food and not refrigerant which can be cold brine. Sometimes even solid carbon dioxide or liquid nitrogen could be used for freezing very rapidly as the temperature of these refrigerants is extremely low. There are many designs of freezers that may control temperature and speed of cooling as well as quality of the frozen food.

### Nutritive Value of Frozen Vegetables

Since frozen vegetables are processed so there are always questions asked by consumers whether they are as nutritious as fresh vegetables. As vegetables are usually frozen soon after harvesting



with minimal heating by way of blanching to deactivate enzymes that degrade the colour and flavour. At frozen temperature there is very little loss of nutrients so frozen vegetables retain nutrient at high levels during long term storage. Studying the effect of freezing it was found that even after 2 months of storage, asparagus, green beans and zucchini did not lose their colour and phytochemicals like lutein and polyphenols as well as vitamin C. 1

Some studies have shown however,

that freezing may affect nutritional value of certain vegetables and specific nutrients differently. One study<sup>2</sup> showed that riboflavin content in frozen broccoli was higher than fresh but frozen peas had lower than fresh. In case of beta carotene fresh peas, carrots and spinach were better than frozen while there was no difference between frozen and fresh green beans and spinach.

Generally, freezing helps retain nutrients of fruits and vegetables but some nutrients degrade when produce is kept frozen for over a year<sup>3</sup>. Blanching may cause greatest losses in the produce. Blanching not only kills harmful bacteria but also prevents loss of flavour, colour and texture during frozen storage. Blanching itself may lose water-soluble B and C vitamins. Normally fruits are not blanched before freezing.

Blanching may cause loss of water-soluble antioxidants about 30% in peas and 50% in spinach. However, the remaining levels are stable during frozen storage without further losses.

Studies<sup>4</sup> have compared the nutrient contents of frozen and fresh produce. In general the results suggest that freezing can preserve nutrient value and that nutrient contents of fresh and frozen fruits and vegetables are similar. Levels of vitamins A and E, carotenoids, minerals and fibre are similar in fresh and frozen produce. These are generally not affected by blanching.

Studies comparing supermarket fresh produce with frozen varieties

of peas, green beans, carrots, spinach and broccoli have found that the antioxidant activity and nutrient contents to be similar.<sup>5</sup>

### Finally

There is no doubt that freshly picked fruits and vegetables are most nutritious and flavourful. However, if these have to travel long distances and wait long times before consumers buy them, they lose significant amounts of nutrients and also they may not be at the peak of their quality when harvested. Frozen fruits and vegetables do lose some nutrients during processes but when compared with the fresh counterparts they have similar nutrients and quality parameters. In addition, they provide not just convenience, they have minimal wastages and can be stored for a long time.

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# REPORT ON 'WEBINAR ON **PLANT PROTEIN** FOR A HEALTHY TOMORROW'



## AUTHOR

Ms Dolly G Soni,  
Executive- Marketing & Digital,  
PFNDAI

PFNDAI in collaboration with Prolicious recently organised a webinar on 'Plant Protein for a Healthy Tomorrow' on 30th July 2021. The purpose behind this webinar was to create awareness among our audiences about plant protein and sustainability.

The speakers for the webinar were Mr Devendra Chawla (Founder-Samyog Health Foods Pvt Ltd), Mr Prakash Chawla (Director- Samyog Health Foods Pvt Ltd), Dr Jagmeet Madan (National President- IDA, Principal- Department of Food Nutrition & Dietetics, SVT College of Home Science, Mumbai), Mr Varun Deshpande (Managing Director, The Good Food Institute India) along with panellists Ms Naaznin Husein (Founder Director-Freedom Wellness Management, Chairperson- Nutrify India Dietetics), Dr Shobha Udipi (Research Director and Head, Kasturba Health Society's Medical Research Centre, Formerly Prof. & Head- Dept of Food Science and Nutrition, SNTD Women's University) and Dr KSMS

Raghavarao (Prof. of Chemical Eng. IIT Tirupati, Ex Dir CSIR- CFTRI) where the panel moderator was Dr B Sesikera (Former Director- NIN, ICMR Hyderabad, Chairman-Scientific Advisory Committee, PFNDAI). There were more than 500 participants in the webinar, whereas the webinar was live on Facebook too.

Ms Dolly Soni (Executive-Marketing & Digital, PFNDAI) started the session by welcoming all on behalf of PFNDAI & Samyog Health Food and gave a short introduction about the campaign on 'Plant Protein for a Healthy Tomorrow'. Ms Dolly also mentioned the aim of this campaign which was to highlight the potentials of plant protein and promote the importance of protein in our diet.

Ms Swechha Soni (Manager- Food & Nutrition, PFNDAI) introduced and welcomed all the speakers and panellists.

Dr Jagadish Pai (Executive Director, PFNDAI) after addressing and welcoming all audiences and members of the webinar, mentioned that Indians are deficient in protein and other micronutrients. Making aware of the importance of protein, especially the plant protein among our audience is very important and that is the reason why PFNDAI with Samyog health foods decided

to organise this webinar. Dr Pai thanked the audience for joining the webinar, he also thanked the judges of the contests, PFNDAI staff and Prolicious staff for their support in this campaign.

First speaker of the webinar was Mr Devendra Chawla. In his presentation 'Inspiration for Protein Crackers' he explained that his brand Prolicious makes snacks which are high in protein and fibre. He mentioned that the reason behind making these snacks is that by increasing the amount of protein and fibre in the diet it helps in alleviating many health-related issues that people are getting these days. Mr Devendra shared his story of how he came up with idea of making these kinds of snacks. He said that at first, he thought of launching the protein bar, so he went to the market to study people behaviour and demand towards protein bar. There he realised that most of the people tend to buy snack items like chips, biscuits, chaklis etc. This gave him the idea of coming up with his snack Prolicious khakhra and crackers which is vegan, gluten free, high in protein, high in fibre, convenient and pocket friendly.

Second speaker of the webinar was Mr Prakash Chawla and he presented on 'Snacking Made Healthy with Proteins'. He said that pleasure of eating, frequent meals throughout the day, etc makes snacking popular. He also mentioned that a US digital marketing agency did a survey in which they found out that 25%

people said that eating snacks stopped them from having a public meltdown. He also talked about the history of snacking and how did it start, he mentioned some oldest snacks too. He also spoke about the common health issues and mentioned that average risk of cardiovascular disease among Indians are 6 times higher than Chinese and 20 times higher than Japanese.

Dr Jagmeet Madan presented on 'Exploring the Potential of Protein in Plant Based Diets- A Nutritionist Perspective'. She informed the audience that plant-based diet helps in controlling high glycemic, decrease in risk of cancer, reduce risk of cardiovascular disease, decrease blood pressure etc. She also said that diets high in calories, added sugar, saturated fats, processed foods and red meat are less environmentally sustainable. Healthy plant-based diets are associated with reductions in greenhouse gases emissions, land use and water use. With the help of pie diagram, she explained the greenhouse gases contribution by food type in average diet. She also informed that the average protein consumption in India is between 0.8-1g/kg BW and that is also

coming majorly from cereals. She talked about high protein sources (Veg), high protein sources (Nonveg) and high protein sources (Milk products). She shared the content of resistant starch in Indian foods. She also mentioned that protein quality is influenced by density of protein, concentration and bioavailability of its amino acids, food storage and processing. There are different ways of improving the quality that are fortification and enrichment, complementation, food processing procedures and food storage. She also focused on the innovations which has taken place in industry. She ended her presentation by addressing that plant protein use needs to be maximized to achieve quality nutrition and higher diet sores.

The last speaker for the webinar was Mr Varun

Deshpande and he presented on 'Innovation in Plant based Protein in India'. He mentioned that 71% of India's 1.3 billion people self-identify as non-vegetarian. He explained that protein diversification has implications across different issues in India and that we can't scale up the animal agriculture as it has a lot of issue and might create challenges. He said that the company GFT's solution are accelerating 'smart proteins' by creating egg, meat and dairy more sustainably and efficiently by making them from plants which are delicious, affordable and accessible.

## Panelists



**Panel Moderator**  
**Dr B Sesikeran**  
Former Director - NIN, ICMR  
Hyderabad.  
Chairman - Scientific  
Advisory Committee, PFNDAI.



**Ms Naaznin Husein**  
Founder Director- Freedom  
Wellness Management  
Chairperson - Nutrifly India  
Dietetics



**Dr Shobha Udipi**  
Research Director and Head,  
Kasturba Health Society's  
Medical  
Research Centre  
Formerly Prof. & Head- Dept of  
Food Science and Nutrition,  
SNDT Women's University



**Dr KSMS Raghavarao**  
Prof of chemical Eng. IIT  
Tirupati  
Ex Dir CSIR-CFTRI





**Nitika Vig**

Nutrition Manager,  
Marico



**Sheryl Sallis**

(RD, CDE, CPT, CISSN, ND,  
MDHA),  
Registered Dietitian and  
Certified Diabetes Educator,  
Founder- Nurture Health  
Solutions

## The Judges

Finally the winners for both the digital poster competition and recipe competition which were organised during the campaign were announced which was judged by Ms Nitika Vig (Nutrition Manager, Marico), Ms Sheryl Sallis (RD, CDE, CPT, CISSN, ND, MDHA, Registered Dietitian and Certified Diabetes Educator, Founder- Nurture Health Solutions), Mr Devendra Chawla (Founder: Samyog Health Foods) and Ms Ruby Sound (Dietician, Founder- Eatwise Nutrition & Wellness Clinic, Secretary- Indian Dietetic Association, Mumbai Chapter). The webinar ended with the vote of thanks by Ms Dolly Soni.

He informed the audience that smart proteins fit into three categories from a production, cost and infrastructure perspective which are plant-based, fermentation and cultivated. He also focused on plant-based food-plant-based meat, plant-based eggs, plant based dairy. He ended his presentation by addressing that there is huge amount of innovation, and it will take a lot of efforts to get this at the right place.

There were a lot of questions from audience which were answered by our speakers in detail. After the presentation by the speakers there was a panel discussion which was moderated by Dr Sesikeran. The enlightening panel answered various questions related to plant protein containing fatty acids, iron from plant-based diet, microgreens and are they good source of plant protein, can a meal be replaced with a plant protein shake, etc.



**Mr Devendra Chawla**  
Founder at  
Samyog Health  
Foods Pvt Ltd



**Dr Jagmeet Madan**  
National President -  
IDA  
Principal-  
Department of Food  
Nutrition & Dietetics,  
SVT College of Hom.  
Sc., Mumbai

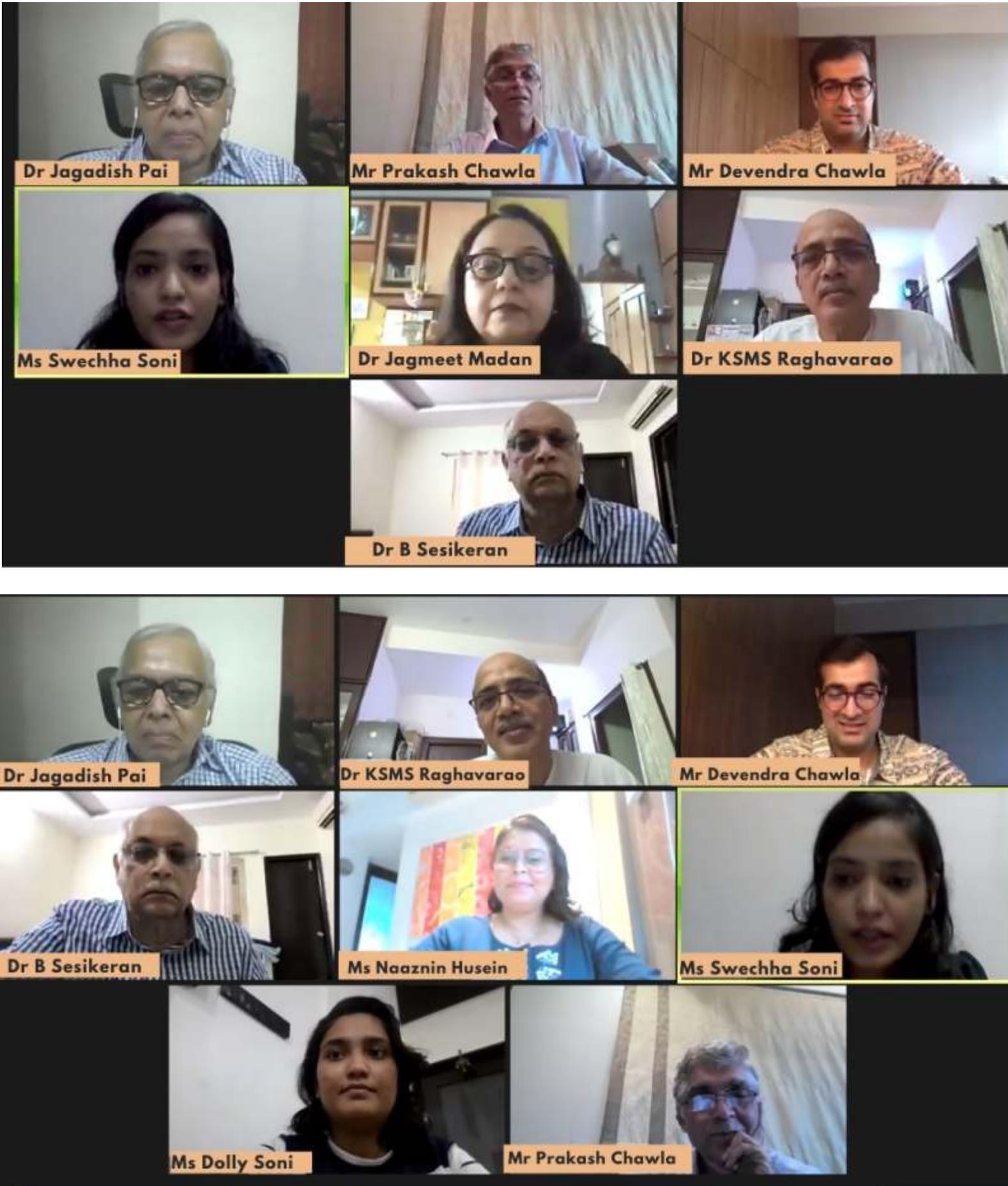


**Mr Varun Deshpande**  
Managing Director  
The Good Food  
Institute  
India



**Mr Prakash Chawla**  
Director at  
Samyog Health  
Foods Pvt Ltd





# REPORT ON PFNDAI REGULATORY WEBINAR ON MANDATORY **DECLARATION** OF FSSAI LICENSE NO. ON SALE OF **FOOD PRODUCTS**

on 14th July 2021 at 3:00 PM on Zoom Meeting Platform

AUTHORS



Ms. Koumudi Chavan,  
Intern, PFNDAI

Ms Shreya Shah & Ms Anuja Rawool  
Intern, PFNDAI

Padte  
Food Scientist,  
PFNDAI

order is concerned about consumer grievances, for recalls and to make people aware.

Protein Foods & Nutrition Development Association of India (PFNDAI) recently organized a Regulatory Webinar on Mandatory Declaration of FSSAI License no. on Sale of Food Products.

Lewis, Food Regulatory Consultant,  
Panelists- Dr. Prabodh Halde, Head regulatory- R & D, Marico, Mr. Ajith John, Head- Supply chain, General Mills.

Mr. Bhupinder Singh, CEO- Vista Processed Foods, Ex-Chairman, PFNDAI, spoke on 'Mandatory declaration of FSSAI license number on sales invoice bills'. Section 31 was introduced on the 8th of June, 2021, and its implementation began on the 1st of October, 2021. He feels that the objectives of this order are its visible and complaint redressal to the consumer, FSSAI license no. on the

Ms. Swechha Soni, Manager- Food & Nutrition at PFNDAI welcomed everyone, and gave a brief introduction on the session topic and welcomed the eminent speakers, Panelist, and moderators. Dr. Jagdish Pai (Executive Director at PFNDAI) gave a warm welcome and invited the dignitaries of the session. Speakers were- Mr. Bhupinder Singh, CEO- Vista Processed Foods, Dr. Shatadru Sengupta, Sr. Director Legal- Hardcastle Restaurants, Mr. Shashank Joshi, Head- GM Operations-Chitale Bandhu Mithaiwale. Panel Moderator- Dr. Joseph

Dr Jagdish Pai, Executive Director, PFNDAI welcomed everyone giving the background of the webinar followed by Dr. Joseph Lewis, Food regulatory consultant, and Chairman-Regulatory Affairs Committee, PFNDAI, who gave a brief overview of the webinar and explained the objectives of the webinar, that aims to understand the purpose of the order, the issues and how the order can comply. He also pointed out that the

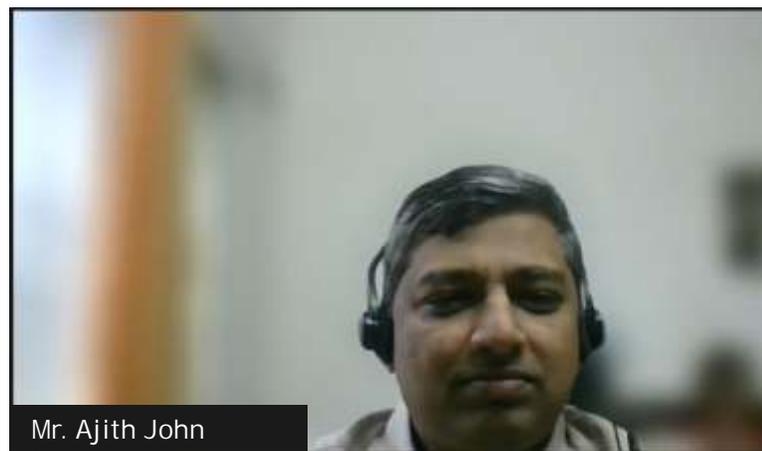


Mr. Bhupinder Singh

invoice will act as unique locator and will be helpful to FBO, and marketer and repacker as other FBO to have invoices, bills, memos and or challans. He then briefed about how a customer can track FBO through the FSSAI application. The licensing and regulation were to be followed by 2011. If the FSSAI License no. is mentioned on the invoice then no other additional documents and transactions will be needed. Lastly, he discussed the Business to Business (B to B) challenges that might arise.

constraints for the supply chain due to the order. He gave a brief about Chitale Bandhu Mithaiwale as a company and then explained the existing regulations and compared them to the new requirements.

He also then addressed certain issues like reviewing all current licenses,



Mr. Ajith John

Food Products. The panelist were Dr. Prabodh Halde, Head regulatory- R & D, Marico, Mr. Ajith John, Head- Supply chain, General Mills.

The discussion began with a summary of the talks by Dr. Lewis and then a few questions taken for the panel on different aspects such as, why cannot the consumer contact through the current addressal system like consumer contact numbers for grievances, which segments of the supply chain are weakest in providing license numbers and whether the existing system is effective at addressing the issues of consumer complaints.

A short Q & A followed after the panel discussion addressing some of the queries raised by the audience.

The webinar ended with a vote of thanks by Ms Abir Ansari.

Dr. Shatadru Sengupta, Sr. Director Legal- Hardcastle Restaurants, Chairman – PFNDAI, explained the purpose of the order in detail by breaking it down into several points. He expressed his views and thoughts on the order and also raised certain questions that could be solved and discussed like “were things untraceable before the order or were there any issues on traceability?” and “order is under what provision of law?”. Lastly, he further explained certain points to be considered for implementation.



Dr. Shatadru Sengupta

increase in revenues, achieving awareness amongst consumers, and so on. He also touched upon the regulation and impact of the order for the industry and supply chain and the challenges in the supply chain in detail. He concluded his presentation by explaining their preparation for the implication of this regulation and its impact.

Mr. Shashank Joshi, Head GM operations, Chitale Bandhu Mithaiwale, spoke about the

The audience had some questions that were addressed in brief details by all the speakers after their respective talks.

The presentations by the speakers were followed by a panel discussion conducted by Dr. Joseph Lewis on the Mandatory Declaration of FSSAI License no. on sale of



Mr. Shashank Joshi





# Protein Foods & Nutrition Development Association of India

Date : 14<sup>th</sup> July, Wednesday  
Time : 3:00pm-5:30pm IST

## Speakers



**Mr Bhupinder Singh**  
CEO-  
Vista Processed Foods  
Ex-Chairman,  
PFNDAI



**Mr Shashank Joshi**  
Head  
GM Operations,  
Chitale Bandhu  
Mithaiwale



**Dr Shatadru Sengupta**  
Sr. Director  
Legal- Hardcastle  
Restaurants  
Chairman, PFNDAI

## Organising Regulatory Webinar

### On Mandatory declaration of FSSAI License no. on sale of Food products

#### Moderator



**Dr Joseph Lewis**  
Food Regulatory Consultant

#### Panelists



**Dr Prabodh Halde**  
Head- Regulatory  
R & D, Marico



**Mr Ajith John**  
Head- Supply Chain  
General Mills



Mr Shashank Joshi



Dr Jagdish Pai



Dr Shatadru Sengupta



Mr Bhupinder Singh

# REGULATORY ROUND UP



By  
**Dr. N. Ramasubramanian,**  
 Director, VR FoodTech,  
[n:ram@vrfoodtech.com](mailto:n:ram@vrfoodtech.com)

Dear Readers

Please find below FSSAI notifications, advisories, orders, etc since the last round up.

[Final notification on fortification of Salt and Milk Powder](#) The different levels of Iodine in fortified salt at manufacturers and distributor level has been replaced with a single limit. Standards for fortification of milk powder, if carried out, has been set.

[Draft regulation amending FSS \(Advertisement and Claim\) Regulation, 2018 permitting nutrient content and health claims in edible Virgin Coconut oil, Chia oil, Avacado oil, High Oleic Sunflower oil.](#)

[FSSAI through its directive dated 16 August 2021](#) has provided the category of fresh fruits and vegetables, surface treated fresh fruits and vegetables, peeled or cut – minimally processed fruits, peeled and cut minimally processed vegetables. This would facilitate the manufacturers while applying for license under FOSCOS.

FSS (Advertisement and Claim) Regulation, 2018 has a list of permitted Disease Risk Reduction (DRR) claims with conditions. New or not listed DRR claims can be made only after obtaining prior approval from the authority following the procedure described in the regulation.

The procedure does not specify the appeal process in case of rejection of the application by

the Authority. [This has been corrected by the directive issued on 27 August 2021.](#) CEO of FSSAI has been made the Appellate Authority and the Chairperson as the Reviewing Authority.

[FAQ on Iodized salt categorically states that salt meant for direct human consumption or used in the manufacture of a food, must be iodized.](#)

[FSSAI invites comments from stakeholders on the method of estimation of Niacin in foodstuffs.](#)

[FSSAI clarifies that a laboratory which is recognized as both primary and referral, can be either a primary or referral for a particular product. This is to avoid conflict of interest.](#)

# RESEARCH IN HEALTH & NUTRITION

The researchers have developed prototype oat-based cookies with slowly digestible starch

06 Jul 2021 Nutrition Insight

PepsiCo, the Quadram Institute and Belgian university KU Leuven are collaborating on research to develop slowly digested starch (SDS) for food product formulation. Using the latest scientific knowledge of how different types of starch are digested, the project aims to introduce consumer-focused starchy products that can contribute to health and reduce the risk of developing diet-related disease.

**Early stages of development**  
Currently, the researchers are developing cereal-based starch products, but the technology is at an early stage and is now being robustly tested, Afzal adds. The EIT Food research project is titled “Sustained energy release starchy food products” and is looking into new technologies, novel food processing techniques and ingredients to develop healthier food options. In the first year, the project has produced oat-based cookie prototypes that deliver a high level of slowly digestible starch. Now EIT Food has approved support for the second year of the project, where the team will develop oat-based drinkable and spoonable products, creating opportunities for a new class of breakfast products with the added benefits of sustained energy release.

## Slowly digestible starch

Not all starch is digested rapidly. Depending on its molecular

structure, how it is processed and the food matrix, starch can be classified as either resistant or as SDS. This determines the overall impact on health.

Slowly digestible starch is more slowly digested in the upper gastrointestinal tract, leading to reduced blood glucose spikes following consumption. Replacing rich in starch foods which are rapidly digested with more slowly digested starches can have a range of health benefits.

## Starches and obesity link

With 10 to 25 percent of the adult EU population being obese and 10 percent having Type II diabetes, there has been a lot of focus on supporting consumers to eat more nutritious foods, Quadram says.

Obesity and diabetes are our two main targets, but replacing rapidly digested starches with more slowly digested starches can also have benefits for cardiovascular disease. Moreover, replacing rapidly digestible starches with more slowly digestible starches in the diet can slow down the onset of metabolic syndrome by reducing damaging peaks in blood glucose.

One way of doing this is to reformulate foods, in particular carbohydrate-rich foods. This is because it is not purely the overall calorific value of foods that defines their impact on health, but also the

rate at which they are digested and that those calories are released. Highly digestible food products, especially starchy foods, are of concern as they may be digested so rapidly that their metabolic effect is comparable to that of free sugars. This results in blood glucose peaks and the rapid release of insulin, which is linked to increased risk of Type II diabetes and cardiovascular disease. Highly digestible foods also have little effect on satiety and energy levels in the hours after eating, which can result in increased snacking and overeating.

## Healthier cookies

EFSA authorizes health claims that may be used on food where the digestible carbohydrates provide at least 60 percent of the total energy and where at least 55 percent of those carbohydrates is digestible starch – of which at least 40 percent is SDS. The consumption of these products may contribute to consumers’ health by reducing the post-prandial glycaemic responses, Quadram asserts.

The consortium’s approach is to select starches from different botanical origins and then carefully optimize processing conditions. These include the milling of raw ingredients and their cooking conditions to produce a wide range of products with carefully tailored slow starch digestion properties. The news comes at a time when carbohydrates are still under scrutiny for their effects on weight gain. A recent study from the US National Institutes of Health suggests that plant-based low-fat diets may result in more significant weight loss than low-carbohydrate diets that include animal products.  
By Kristiana Lalou



## Senior-friendly flavours: Researchers shed light on perception degradation in fight against malnutrition

06 Jul 2021 Nutrition Insight



The ability to perceive savoury flavours like fried meat and onions degrades with age more quickly than some fruity or vanilla flavours, according to research from the University of Copenhagen, Denmark. These insights into preferred flavours could improve the meals and dining experiences of older adults and help fight malnourishment in senior populations, the researchers say.

“Olfactory function is essential for how we perceive the world around us, which specifically is relevant in the context of foods and meals, where aromas contribute to the unique characteristics of foods,” study author Eva Honnens de Lichtenberg Broge, tells NutritionInsight. Figures show that half of those aged over 65 admitted to Danish hospitals are malnourished. The same applies to one in five nursing home residents. Notably, smell helps to stimulate appetite and serotonin levels. Commenting on the findings, Sonja Nodland, principal scientist at Kerry, emphasizes that demand is increasing for food, beverage and supplement products that support the immune system but also deliver great taste for older people.

### Industry weighs in

Commenting on the findings, Sonja Nodland, principal scientist at Kerry, emphasizes that demand is increasing for food, beverage and supplement products that support the immune system but also deliver great taste for older people. Other taste considerations Nodland flags include reducing sugar and salt to

ward off diabetes and hypertension-related diseases, as well as formulating high-protein offerings. Renate Merz, Silesia’s senior product manager, adds that indulgence is very important to seniors. “Particularly at a very advanced age, food stays one of the few pleasures. Food shouldn’t only be healthy but also tasty. The opportunities for functional food development are enormous when you speak with seniors wishing to live longer, healthier and more mobile.”

Silesia recommends using stronger flavour profiles in foods targeting older adults. Merz also notes that many members of “Generation Silver” are interested in international flavours, while others prefer traditional tastes. “To target this whole consumer group, innovative recipes in meat and dairy alternatives might be combined with classic popular flavours, for example. On the other hand, classic products like yogurt are also appealing for senior consumers with new exciting taste directions.”



### Preference unrelated to intensity

The study shows that the declining sense of smell among older adults is more complex than once believed. “While older people’s ability to smell fried meat, onions and mushrooms is markedly weaker, they smell orange, raspberry and vanilla just as well as younger adults,” says De Lichtenberg Broge. “Thus, a declining sense of smell in older adults seems rather odour specific. What is really interesting is that how much you like an odour is not necessarily dependent on the intensity perception.”

Specifically, the results show that as long as a food odour is recognizable, its intensity will not determine whether or not it is liked. For example, preference seemed to be largely unaffected for fried meat, onions and mushrooms, despite the largest decline in intensity perception was seen for these specific odours. Meanwhile, older participants liked coffee’s aroma less than younger adults, even though the ability to smell it had declined. If one wants to improve food experiences of older adults, it is more relevant to pay attention to what they enjoy eating than it is to wonder about which aromas seem weaker to them.

### Unpacking the reasoning

The researchers are now speculating why the intensity decline was most pronounced for fried meat, onions and mushrooms – which are all salty and umami in nature. “It is widely recognized that saltiness is the basic taste most affected by aging. Since taste and smell are strongly associated when it comes to food, our perception of aroma may be disturbed if one’s taste perception of saltiness is impaired to begin with,” explains De Lichtenberg Broge.

The researchers speculate that preference stability may be due to the difference between the perceptual mechanisms of intensity perception and preference. This is because intensity perception relies on analytical processing, whereas preference relies on emotional layered information. “We also speculate that the continuous habituation to a new perceptual condition, which happens gradually and without notice, plays a role in the robustness of preference,” De Lichtenberg Broge continues.

By Katherine Durrell





## Protein supplements during training work for women but not men, study finds

009 Jul 2021 Nutrition Insight

Taking a protein hydrolysate supplement during carbohydrate-restricted training helps women, but not men, increase training intensity. This is according to a new study that will be presented this week at the Physiological Society's annual physiology conference 2021.

"The application of the findings from our study are purely for the specialized training tactic of overnight fasted carbohydrate-restricted exercise that aims to enhance training," says Tanja Oosthuyse, lead author of the study. "Racing nutrition, however, is very different, and at the moment, guidelines are standard for both men and women. We need to specify potential differences so that both men and women can train and race at the highest possible caliber," she continues.

### Impact on women's training

While the protein supplement improved training intensity in women, it did not boost training intensity in males and even had a minor detrimental effect. It made exercise feel more difficult for men as their bodies had to work harder to break down the supplement than when they merely drank plain water. The findings of this study suggest that women should take protein supplements during carbohydrate-restricted fasting exercise, while men should be aware that it could increase their perception of effort.

Future research is needed to see if using protein hydrolysate supplements during carbohydrate-restricted training for a more

extended period, such as weeks or months, is advantageous. The menstrual phase was not taken into account in this study. Follow-up research is needed to see if improved training intensity while consuming a protein hydrolysate versus placebo water is specific to the menstrual phase.

### Women's sports nutrition research lacking?

According to the researchers of the study, the majority of nutrition recommendations for athletes are based solely on research conducted on men. Recently, experts highlighted that the inclusion of both women and men in clinical trials is essential to identify critical distinctions better and, in turn, advance public health. Moreover, the women's health sector faces difficulties when eliminating gender stereotypes and educating consumers on individual probiotic strains.



### Sports performance and nutrition

The new study also highlights the need for personalization in sports diets, supplements and overall nutrition. Previously, continuous glucose monitors revealed the shortcomings of fast-acting sugary sports nutrition products, which can cause an athlete's blood sugar to rise before dropping below the acceptable level. Dr. Marc Saramito, a sports doctor, emphasizes that nutrition must be tailored to the athlete. Moreover, individualizing nutritional regimens for male rugby players could assist them in achieving peak performance and recovery.

By Nicole Kerr



## Fermented foods boost gut microbiome diversity and reduce inflammation, study finds

13 Jul 2021 Nutrition Insight

A diet rich in fermented foods can increase the diversity of gut microbes and decrease molecular signs of inflammation, according to a new study led by researchers at the Stanford School of Medicine, US. In the study, 36 healthy adults were randomly assigned to a 10-week diet that included fermented or high-fibre foods. The two diets resulted in different effects on the gut microbiome and the immune system.

Overall microbial diversity was increased by eating yogurt, kefir, fermented cottage cheese, kimchi and other fermented vegetables, vegetable brine beverages and kombucha tea, with larger servings having a more substantial effect. The study "provides one of the first examples of how a simple change in diet can reproducibly remodel the microbiota across a cohort of healthy adults," says Justin Sonnenburg, an associate professor of microbiology and immunology at the Stanford University School of Medicine.

### Impacting immune status

In addition, four types of immune cells in the fermented food group were less activated. Moreover, the levels of 19 inflammatory proteins evaluated in blood samples decreased.

Interleukin 6, one of these proteins, has been linked to rheumatoid arthritis, Type 2 diabetes, and chronic stress.



“Microbiota-targeted diets can change immune status, providing a promising avenue for decreasing inflammation in healthy adults,” explains Christopher Gardner, the director of nutrition studies at the Stanford Prevention Research Center. “This finding was consistent across all participants in the study who were assigned to the higher fermented food group”.

**Impact of a fibre-rich diet**

In participants who ate a high-fibre diet rich in legumes, seeds, whole grains, nuts, vegetables and fruits, none of the 19 inflammatory proteins decreased. On average, the diversity of their gut microbes remained stable. “We expected high fibre to have a more universally beneficial effect and increase microbiota diversity,” adds Erica Sonnenburg, a senior research scientist in basic life sciences, microbiology and immunology at the Stanford University School of Medicine. “The data suggest that increased fibre intake alone over a short period is insufficient to increase microbiota diversity.”

**Gut microbiomes’ impact on immunity**

Diet affects the gut microbiome, which can alter the immune system and overall health. Obesity and diabetes have been linked to a lack of microbiome diversity. “We wanted to conduct a proof-of-concept study that could test whether microbiota-targeted food could be an avenue for combating the overwhelming rise in chronic inflammatory diseases,” says Gardner. Fermented foods can aid with weight management and reduce the risk of diabetes, cancer and cardiovascular disease.

By Nicole Kerr

**NattoPharma welcomes study linking vitamin K2 with Alzheimer’s prevention**

13 Jul 2021 Nutrition Insight

NattoPharma is highlighting a new study flagging

vitamin K2 as a potential method for Alzheimer’s disease (AD) “prevention.”

However, the scientists warn that additional clinical research is needed.

A review of research published in Nutrients examined the body of evidence linking vitamin K2 to factors involved in Alzheimer’s disease pathogenesis, concluding that K2 has the potential to slow the progression of AD and potentially prevent it.

The US researchers, who were not funded by NattoPharma, investigated vitamin K2’s antiapoptotic and antioxidant effects. They also examined its impact on neuroinflammation, mitochondrial dysfunction, cognition, cardiovascular health and co-morbidities in Alzheimer’s disease. “Our review is the first to consider the physiological roles of vitamin K2 in the context of AD,” the study authors Alexander Popescu and Monica German from Harvard Extension School and Pacific Northwest University of Health Sciences, state. “Given the recent shift in AD research toward nonpharmacological interventions, our findings emphasize the timeliness and need for clinical studies involving vitamin K2.”

**Alzheimer’s in the spotlight**

The prevalence of AD has risen dramatically in recent years, and it continues to be a primary cause of chronic disability and mortality. It is the most common type of dementia, affecting an estimated 6.2 million US adults, with that figure expected to more than double by 2050. The National Institutes of Health states that treating certain dietary



deficiencies can help prevent or delay dementia caused by Alzheimer’s disease. Also, food influences the brain’s ability to think and remember as people age.

“There is growing evidence for possible dietary risk factors in the development of Alzheimer’s disease and cognitive declines with age, such as antioxidants, omega 3s, dietary fats, and B vitamins,” says Dr. Hogne Vik, chief medical officer at NattoPharma. “Moreover, research suggests that people with low levels of vitamin D are more likely to develop Alzheimer’s disease and other forms of dementia. We are gratified that vitamin K2 is becoming a prominent part of this conversation, particularly as most of the world’s population expresses a K deficiency,” he continues.

By Nicole Kerr



**Chrononutrition: Protein at breakfast may boost strength and muscle growth**

20 Jul 2021 Nutrition Insight

Protein intake at breakfast induces an increase in muscle growth when compared with the effects of protein intake at dinner, according to researchers from Waseda University, Japan.

“A protein-rich diet at breakfast is important to maintain skeletal muscle health and enhance muscle volume and grip strength,” comments professor Shigenobu Shibata, who led the research.





“For humans, in general, the protein intake at breakfast averages about 15 g, which is less than what we consume at dinner, which is roughly 28 g. Our findings strongly support changing this norm and consuming more protein at breakfast or morning snacking time.”

**Importance of protein type**

The researchers found that intake of branched-chain amino acids (BCCA) early in the day increased the size of skeletal muscles. The researchers fed laboratory mice two meals per day containing either high (11.5 percent by proportion) or low (8.5 percent by proportion) protein concentrations. The results were determined by assessing the induced hypertrophy of the plantaris muscle, which is located in the leg.

Specifically, the ratio of muscle hypertrophy determined against the growth of the control muscle was 17 percent higher in mice fed 8.5

percent protein at breakfast than in mice fed 11.5 percent protein at dinner – despite the former group consuming a low proportion of protein overall.

To confirm the association of these effects with the workings of the circadian rhythm, the researchers next engineered whole-body mutant Clock<sup>-/-</sup> or muscle-specific Bmal1 knockout mice lacking the genes that control the biological clock. They repeated diet distribution experiments on these mice but did not observe similar muscle change, which confirmed the involvement of the circadian rhythm in muscle growth in the context of protein intake.

**Human testing**

To check if their findings were applicable to humans, the team recruited women in their study. They tested if their muscle function, determined by measuring skeletal muscle index (SMI) and grip strength, varied with the timing of the protein-rich diet consumed. Sixty women aged 65 years and above who took protein at breakfast rather than at dinner showed better

muscle functions, suggesting the possibility of the findings to be true across species. Additionally, the researchers also found a strong association between SMI and the proportion of protein intake at breakfast relative to total protein intake throughout the day.

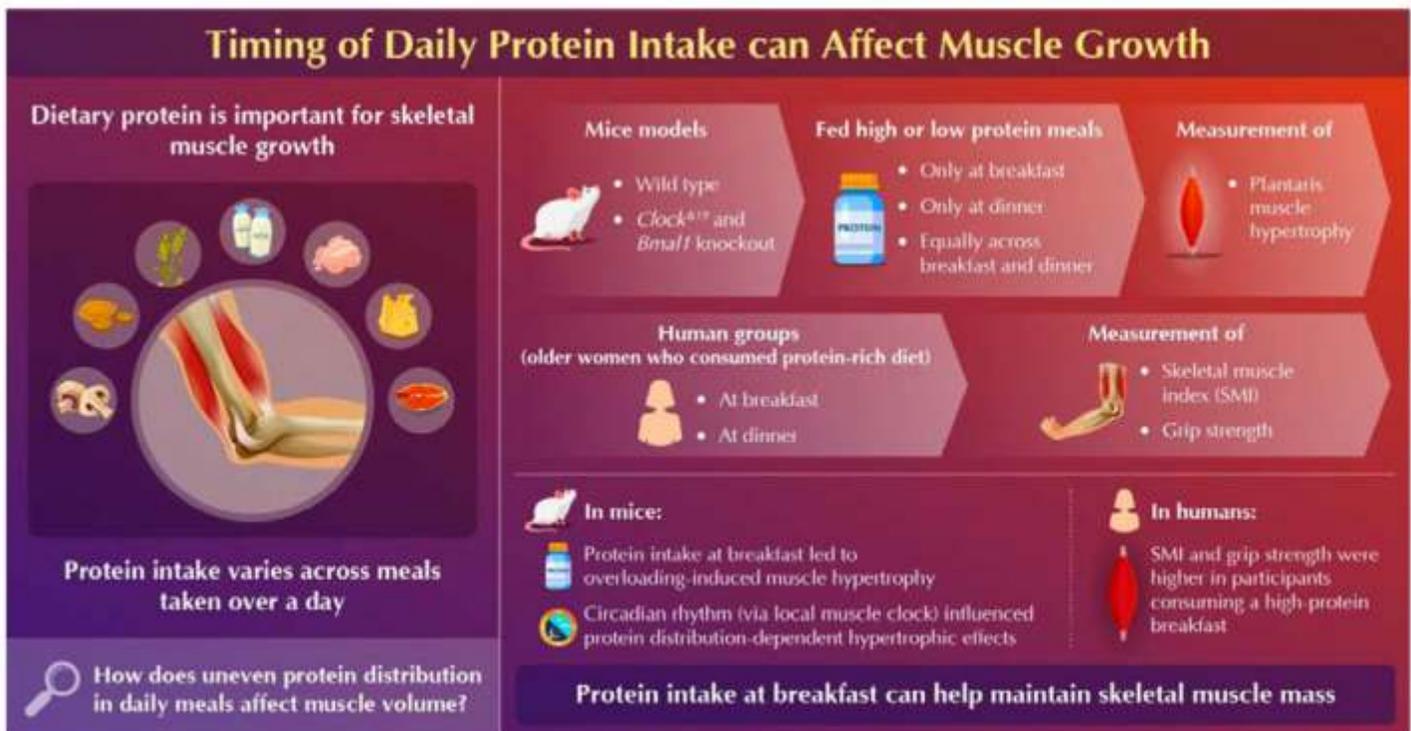


**Eating in good timing**

The study builds on the concept of “chrononutrition,” in which when you eat is as important as what and how you eat. The reason behind this is the body’s circadian rhythm. This biological clock is followed by all cells and controls life functions like metabolism and growth. Protein digestion and absorption have been found to fluctuate across day and night according to this clock.

*Edited by Kristiana Lalou*

Eating a protein-rich diet can help increase muscle growth and strength.



Distribution of Dietary Protein Intake in Daily Meals Influences Skeletal Muscle Hypertrophy via the Muscle Clock  
Aoyama et al. (2021) | Cell Reports | DOI: 10.2139/ssrn.3345547



### Study develops recipe combining chickpea flour and psyllium for gluten-free bread

23 Jul 2021 Nutrition Insight

A recipe combining chickpea flour and psyllium, a plant-derived soluble fibre, has been developed by the Federal University of São Paulo, Brazil. A nutritionist at the university is pursuing a study line that focuses on improving gluten-free products in the country.

“We succeeded in producing bread with 17 percent psyllium. Because it absorbs water, dough made with psyllium can be moulded into many shapes, just like rolls and loaves made with conventional wheat



flour,” says Vanessa Dias Capriles, a professor in the Department of Biosciences at the university. Psyllium is a fibrous material made from husks of the seeds of the plant *Plantago ovata*. It was used

to increase the fibre content as it is hygroscopic and expands to form a gelatinous mass when mixed with water.

“In more recent studies, we associated psyllium with chickpea flour and obtained surprisingly good results. Besides high acceptability and nutritiousness, its advantages include a low glycemic response [it does not raise blood sugar significantly] and heightened satiety in healthy people,” adds Capriles. “Another fascinating point is that it maintained its acceptability even after being stored at room temperature for seven days.”

Psyllium is a popular choice among

consumers looking for functional meals, and it’s frequently recommended for constipation, diabetes and atherosclerosis. The need for gluten-free Gluten is a protein complex present in wheat, rye and barley cereals. It gives dough its elastic structure, allowing loaves and rolls to be baked into various forms while staying flexible and crusty. When combined with preservatives, it also extends the shelf life of bread at room temperature.

Gluten intolerance has spread globally, and gluten-free products are becoming increasingly popular. The issue is that most gluten-free products on the market fall short of consumers’ expectations in terms of appearance, aroma, flavor and durability.

By Nicole Kerr

### Rice and pea fermentation boosts protein efficiency in plant-based probiotic products

30 Jul 2021 Nutrition Insight

Fermenting pea and rice dairy alternatives with probiotic strains can yield higher quality protein that is more digestible.

This was the conclusion of a study by the Institut National de la Recherche Scientifique (INRS), Canada, in collaboration with Bio-K+, a probiotics company. The findings shed new light on probiotics’ capabilities as a functional ingredient beyond their digestive health benefits. Notably, the rice and pea beverages fermented with Bio-K+’s *Lactobacillus acidophilus* CL1285, *L. casei* LBC80R and *L. rhamnosus* CLR2 yielded the same quality of protein as casein, an animal protein found in milk.

Breaking it down with



### fermentation

One of the primary dilemmas with plant-based proteins is their digestibility, notes Professor Monique Lacroix of the INRS, who led the team of researchers. “They often are insoluble in water and under globular form. That means our digestive enzymes have more difficulty breaking them down. Animal proteins, on the other hand, usually take the form of elongated fibres that are easily processed by digestive enzymes.”

Researchers discovered that lactic acid bacteria could predigest pea and rice proteins. For this, the plant proteins need to be added before the fermentation stage of beverage



production. Fermentation allowed for the production of peptides (protein fragments) resulting from the breakdown of proteins during

fermentation, facilitating their absorption during digestion. The findings were published in the *Journal of Food Science*.

### Measuring protein’s impact

The protein quality was determined as the protein efficiency ratio (PER), net protein ratio (NPR), and the apparent (AD) and the true digestibility (TD) evaluated in vivo. The probiotic beverage was incorporated into a rat diet at a final concentration of 10 percent protein for the evaluation of the PER, the NPR, the AD and the TD. The protein digestibility amino acid score was also calculated. Results showed that the beverages enriched with fermentation had no effect on the TD but significantly increased the PER and the NPR from 1.88 to 2.32 and from 1.66 to 2.30, respectively. Thus, the fermentation increased the protein quality of the PRF probiotic beverage.

# FOOD SCIENCE & INDUSTRY NEWS

## Ice cream trends: Non-dairy and low-sugar NPD soars, but flavour remains key purchasing factor

12 Jul 2021 Nutrition Insight

Plant-based, non-dairy and reduced-sugar reformulation is reshaping the ice cream segment, with trending flavours and ingredient mashups shaking up NPD.

FoodIngredientsFirst examines the most popular flavours and stand-out launches in the space. “The market share for non-dairy ice creams has been increasing at a steady rate, accounting for 6 percent of all global dessert and ice cream launches in 2020,” Akhil Aiyar, senior market analyst for Innova Market Insights, tells FoodIngredientsFirst. “Between 2019 and 2020, non-dairy ice cream witnessed a year-over-year growth of 32.2 percent, compared to nearly negligible global growth between 2018 and 2019. In terms of non-dairy flavors, salted caramel, strawberry and mango are among those that show the fastest growth in this segment,” Aiyar adds.

### Non-dairy, plant-based market

Many other consumers are experimenting with dairy-free products, with health, dietary variety and environmental concerns as the key drivers for purchase, the market researcher notes. Non-dairy ice cream launches almost tripled between 2016 and 2020. They have been particularly significant in North America (25 percent of all ice cream launches in 2020), Australasia (20 percent) and West Europe (10 percent).

The increasingly mainstream appeal of non-dairy is reflected in the growing range of formats (e.g., sticks, cones and mochi), in the presence of more mainstream brands on the shelf, and in the rising focus on indulgence. For example, My/Mochi Ice Cream recently launched My/Mochi Oat Milk Frozen Dessert, a non-dairy, vegan line of My/Mochi with gluten-free, non-GMO and allergen-friendly ingredients. Ingredient choices are diverse and continue to evolve. “Animal free” could be the next step. i.e., dairy protein produced via fermentation, the research specialist predicts. An example of plant-based innovation is Wildgood, which is made with extra virgin olive oil.

### Stand out non-dairy NPD

The number of companies launching non-dairy ice creams has also witnessed growth, with a 33 percent increase in the number of global players in the segment between 2019 and 2020, according to Aiyar. Nick’s ice cream and animal-free dairy company Perfect Day recently partnered to launch a line of vegan dairy ice creams. The seven flavours include Swedish Mint Chip, Choklad Choklad and Karamell Swirl.

Forager Project launched a line of organic, dairy-free ice cream that’s free from lactose, dairy, soy and gluten and is certified organic and

vegan. Made from organic cashew milk and other simple ingredients, Forager Project’s ice cream is delicate in flavour and creamy in texture, offering consumers a dairy-like ice cream experience without compromising taste and environmental impact, the company says. SweetPea launched a creamy, non-dairy ice cream that harnesses the power of protein-packed chickpeas to deliver half the calories and half the fat. Meanwhile, NadaMoo! – a dairy-free, coconut milk ice cream rich in plant-based ingredients – launched four no sugar added flavours to its current, creamy line-up in flavours Vanilla, Strawberry, Chocolate and Mint Chip. Lastly, Baskin-Robbins’ also unveiled an oat milk-based, vegan-friendly flavour: “Non-Dairy Strawberry Streusel.”

### Taste and flavour reign

According to an Innova Market Insights report on ice cream trends, flavour remains king as over half of consumers buy ice cream because “it’s tasty,” while more than a third see it as an indulgent treat or as something to make them happy. Almost three-quarters of ice cream buyers said flavour was an important factor when shopping in this category. Milk chocolate, vanilla and strawberry are top flavours, but their share is falling as variety increases. New entrants to the top 10 between 2016 and 2020 include salted caramel, brownie and lemon.

There can be regional differences in flavour preferences, e.g., dulce de leche is high in the Latin American rankings, matcha tea in Asia and chocolate chip in North America. Asian tastes are distinctly different from the rest of the world, but



their influence is spreading. Consumers are looking for natural ingredients and clean label demands are still strong, the market researcher says. Notable trends in NPD include simpler and shorter ingredients lists, ethical variety, local sourcing (particularly in Australasia and West Europe) and the use of real fruit to further endorse additive-free recipes.

#### Low sugar, high indulgence

Ice cream consumers are still interested in healthier choices. Sugar is a particular concern; almost 6 percent of 2020 launches carried sugar claims versus around half as many for fat reduction and protein enrichment, Innova Market Insights data shows. With sugar reduction continuing to be in focus, 47 percent of consumers globally say they tend to like less sweet, savoury or even bitter tastes more.

Meanwhile, 60 percent prefer tastes which are lighter on the palette and less sugary or heavy. Tapping into shifting tastes is an opportunity for NPD. In sugar reduction, sweetener blends are key and attention is shifting to new-generation sweeteners. Front-of-pack calorie counts are increasingly important, while high protein recipes often coincide with sugar reduction. Low carb products with keto claims have also burst onto the scene in North America.

Mammoth Creameries recently released three new flavours of its keto-friendly, diabetic-conscious frozen custard, including Butter Coffee, Strawberry and Butter Pecan. In the same arena, Halo Top's "Keto Series" launched in early 2020 and expanded its flavour options recently with Sea Salt Caramel, Peanut Butter Chocolate, Berry Swirl and Chocolate Cheesecake.

By Kristiana Lalou



## Innova Market Insights explores "new wave of opportunity for functional nutrition"

14 Jul 2021 Nutrition Insight

Consumers across the globe are placing increased emphasis on positive nutrition rather than the more traditional methods of diet control, according to analysis by Innova Market Insights.

An average 71 percent of respondents in Innova's 2020 Health & Nutrition Survey indicated that it was either "important" or "very important" to choose food and drink products that positively boost nutrition or benefit how the body functions. The new wave of opportunity for functional nutrition product launches for 2021 and beyond will be explored further in a webinar on July 19.

Pandemic influence on well-being demands

The long-established trend toward proactively managing health and well-being has been brought into sharper focus by the COVID-19 pandemic. This trend encompasses the growing desire to maintain physical and mental fitness developing alongside the immediate focuses on personal health security and hygiene. Consumers from different generations and different parts of the world are today invested in their own personalized nutrition, with varying needs, motivations and behaviour driving interest in specific functional benefits. However, there are some differences among age groups, notes the market researcher. The under 35s tend to focus more on physical appearance and performance, for example, while the older groups, particularly the Boomers (56+ years), are more interested in targeted or age-specific health benefits. Even prior to the pandemic, consumers were taking a more holistic approach to health, focusing



on positive nutrition to boost the body's resilience and improve physical, mental and emotional well-being. This included choosing functional food and beverages, as well as maintaining or increasing exercise, protecting the body from health threats and utilizing more self-care products at home as access to shops and services was restricted.

#### Gut feeling

According to Innova Market Insights, future directions for NPD will be led by growing opportunities for products carrying multiple health claims, such as gut health, immunity and mood-boosting benefits. The additional advantages of a healthy gut – beyond the more established areas of digestion and immunity – continue to be explored. For instance, Innova Market Insights highlights rising evidence about the gut-skin axis and how reducing sugary and fatty diets can help tackle skin and joint inflammation.

Similarly, there is a growing understanding of how good bacteria in the gut can prompt improvements in mental health, enabling improvements in mood and happiness by reducing stress and fatigue, as well as optimizing relaxation and sleep patterns. This has seen rising use of mood-related claims for new products, particularly those highlighting brain function, focus and concentration, often linked to the inclusion of adaptogens such as CBD. One example of NPD that integrates each of these key positionings is Toodaloo, a new US snack brand launching a line of plant-based adaptogenic trail mixes. Arriving in five varieties, each trail mix is infused with herbs and superfoods that target restoration and energy, as well as skin, gut and mental health.

Edited by Benjamin Ferrer



## Cognitive enhancement: Mood, memory and healthy aging central focus in a post-pandemic world

14 Jul 2021 Nutrition Insight

Brain-boosting ingredients are rising fast as COVID-19 has put extra stress on consumers' mental health and well-being. Mood, memory and staying mentally agile in older ages are also central concerns.

An industry roundtable speaks to NutritionInsight about consumer demands within cognitive enhancement and trending ingredients. According to recent Givaudan research, consumers believe that they can impact cognition through a few different avenues. "According to the study, 38 percent of Australians consume energy products to stay focused all day long. On the other hand, 35 percent of Japanese consumers consume relaxation products to reduce mental fatigue," says Dan Souza, global product manager, Givaudan, Taste and Wellbeing.

"Many consumers are also looking for products with a more direct impact on cognition, such as clearing the mind and improving focus, attention and concentration." With concerns over mental health becoming more significant than

ever, "Mood: The Next Occasion" is also a top trend for 2021 tipped by



Innova Market Insights as making an impact. The market researcher reveals that 44 percent of global consumers have taken steps to improve their mental and emotional well-being.

COVID-19 impact on brain health Souza says more brands have been focusing on the emotional and mental well-being side of health due to the uncertainty and stress generated by the COVID-19 pandemic. "It's no surprise that consumers are feeling overworked and overwhelmed and are looking for mood-management products. Sleep-aiding adaptogens and products with calming properties are on the rise," says Roar Hernes, senior vice president of sales & marketing EMEA at Aker BioMarine Antarctic. "Eating well and having a diet rich in omega 3 fatty acids is interestingly seen as one of the top recommendations to fight depression," Hernes notes.

Olaf Weitz, head of marketing & business development at Finzelberg, also brings into focus the new work-from-home culture and its effects on brain health. "Remote work is often performed at a much higher speed, with limited times in between meetings and video conferences. Simultaneously, consumers have to handle more information and make decisions in less time – all that while the balance between professional and private life has become more challenging for many consumers," he notes. "We see this as a big influencing factor, driving interest in mental health and cognition enhancement products. It can help consumers concentrate and focus on those challenging tasks so that they can perform better in challenging times."

Healthy aging and brain agility Behnaz Shakersain, nutritionist at AstaReal, supports that a growing segment of the global population is living a longer life. "To fully enjoy this, the aging populations need to maintain health well into older ages. Well-preserved brain and cognitive function are key elements for

healthy aging and a better quality of life throughout the whole lifespan. A growing number of consumers are seeking science-backed, evidence-based natural and sustainable nutritional solutions that sharpen their memory, prevent forgetfulness and help them to have a better state of mind and mood."

### Trending ingredients

Consumers see a variety of paths to cognitive enhancement, including via adaptogen ingredients. They seek NPD that can not only have a direct cognitive benefit but also support relaxation, according to Souza. Already known for its cognitive benefits on attention and working memory, Cereboost has recently been the subject of new soon-to-be-published clinical research demonstrating its effect on calming the mind and improving mental clarity.

### DHA and EPA

More and more publications are also investigating the benefits of EPA and DHA in mood disorders, depression and cognitive function, notes Hernes. "The brain is a lipid-rich organ, and DHA and EPA play a critical role in the development and maintenance of a healthy brain structure and function." Due to their role in neuro-inflammation, cell signalling and brain structure, decreasing levels of DHA and EPA have been implicated in a range of neurological disorders. "Aker BioMarine is focused on exploring the importance of LPC as a specific transporter to allow DHA and EPA to cross into the brain," Hernes asserts.

### Natural brain boosters

Astaxanthin has also shown a wide range of benefits on different bodily systems, including skin, heart, eye, muscles, and immune system.



“Our brain is the most sensitive organ to oxidative stress,” notes Shakersain. “A growing body of scientific evidence is shedding light on the neuroprotection potential of astaxanthin and its positive effects on memory and mood.” “Scientifically proven antioxidant, anti-inflammation and anti-apoptotic properties of natural astaxanthin make it a dominant candidate in the market exerting beneficial effects on both acute brain injuries and chronic neurodegeneration/cognitive impairment,” Shakersain adds. “Consumers are looking for plant-based ingredients for cognitive health and healthy aging,” Weitz supports. Finzelberg offers its evidence-based ingredient Concental for cognitive enhancement.  
 By Kristiana Lalou



**Better-for-you snacking NPD addresses mood support and transparency demands**  
 19 Jul 2021 Nutrition Insight

Functional and better-for-you snacking NPD is targeting key demands for high-performance ingredients, including focus-enhancing formulas and gluten-free alternatives.

In this space, The Functional Chocolate Company launched Brainy Chocolate Bars, while Calbee and Blops rolled out alternatives to traditional snacks like chips. According to a 2020 survey from Innova Market Insights, an average of 71 percent of respondents indicated that it was either “important” or “very important” to choose food and drink products that positively boost nutrition or benefit how the body functions.

The Functional Chocolate Company’s new formulation is designed to assist with focus and productivity. “As we come out of such an unusual year, the challenge of balancing work or studies with outside responsibilities and passions is more difficult than ever before,” says CEO Nicole Smith. The orange-flavoured treat includes botanicals like ginkgo, bacopa and rhodiola. This is paired with a blend of amino acids, omega 3 fatty acids and Chocamine, a patented cocoa-based ingredient that may help improve cognitive function.

**Alternatives to tortilla chips**  
 Meanwhile, Calbee America has brought San Joaquin Almond Nut Chips to market. The grain-free tortilla chips are primarily made from almonds and cassava flour. They are then cooked in avocado oil. “For the growing number of health-conscious consumers seeking an alternative to corn-based tortilla chips, our new San Joaquin Almond Nut Chips deliver,” says Sandra Payer, marketing director with Calbee America.

These credentials help the company address increasing consumer demand for transparency, as three in five consumers have demonstrated interest in learning more about where their food comes from and how it’s made, according to Innova Market Insights.

**Harnessing a superfood**  
 Across the Atlantic, Blops is a UK-based example of vegan better-for-you snacking. The name is derived from “blossom pops,” as the company offers popped lotus seeds. Lotus seeds have been consumed as a “superfood” snack for thousands of years in countries such as India and China. The range is marketed as all-natural, a good source of fibre and gluten-free. According to the company, popped lotus seeds can enhance digestion, heart health, sleep and healthy aging, while helping manage diabetes and high blood pressure.  
 By Katherine Durrell

**Industry turns to nootropics and energy ingredients to boost sports performance**



21 Jul 2021 Nutrition Insight

Ingredients like nootropics and energy boosters are shaking up the sports nutrition sector. However, a roundtable of experts from Bioenergy Life Science, Glanbia Nutritionals, Lonza Group and PLT Health Solutions share that the term “sports performance boosters” is difficult to define as it evolves and incorporates different segments as time progresses.

“Increasingly, we see the term ‘active nutrition’ as a replacement for what has been typically known as ‘sports nutrition.’ For years, this meant the body-building and fitness community. Recently, many of us have been using ‘sports/active nutrition,’” says Steve Fink, vice president of Marketing at PLT Health Solutions. “This shift in terminology indicates a broadening of the market for what we have called sports nutrition.” “While there is no single definition for sports performance boosters, BLS strongly believes that this term should be reserved exclusively for science-backed ingredients and formulas proven to safely deliver a competitive edge,” Marianne McDonagh, vice president of sales at Bioenergy Life Science, adds. Innova Market Insight data shows that one of the top health positionings of sports nutrition launches including “recover or recovery” claims was Energy/Alertness, which featured on 17 percent of 2019 launches.





When comparing 2019 and 2018, the market researcher found that the use of energy ingredients in food and beverage launches has increased globally, with a 14 percent year-over-year increase. In 2019, the top category of global product launches tracked with energy ingredients was Sports Nutrition (54 percent).

### Evolving sector

The shift in consumer behaviour in the sports performance industry began with consumers who showed an interest and passion for knowing what's inside sports performance products and how those ingredients work, McDonagh comments. "Today, the sports performance market is about more than packaging and unique delivery systems. It's based on science and effectiveness. Bioenergy Ribose stands up to consumers' scrutiny because it is known as a well-researched, branded ingredient designed to increase energy and improve sport performance at a cellular level." "Benefits and ingredients that were previously not used in sports nutrition are finding their way over. These include cognitive support for enhanced focus and mood; joint health and immune health benefits for faster

recovery times; and the ability to improve quality of workouts," Fink says.

### Energy boosters in focus

Energy boosters are a growing category within the sports nutrition industry. Similar to sports nutrition, the definition of energy and what defines a science-backed booster is often confused. "Energy is more than caloric intake. Through our ongoing primary research, an extensive understanding of adenosine triphosphate (ATP) was developed," McDonagh continues.

### Consumers' relationship with energy boosters

PLT Health Solutions commissioned a consumer research study on pre-workout energy and buyer preferences in 2018. The survey included 161 male respondents between the ages of 20 and 40 who frequently take pre-workout supplements. The survey results revealed a need for longer-lasting energy, with 90 percent of respondents having a preference for multi-phase energy over caffeine. Additionally, the need for

clinically supported claims was voiced by 92 percent of participants. "Consumers are increasingly reading labels and want less artificial, better-regulated sports nutrition," explains Tara Bane, EMEA marketing manager for Glanbia Nutritionals. "Thirty-four percent of UK consumers believe there is not enough regulation within the sports nutrition industry. Additionally, 65 percent of French consumers agree they are more likely to trust a food or drink product if the packaging explains where the ingredients are sourced", Bane continues.

### A shift in consumer behaviour

"Beginning in June 2020, we saw that exercise patterns were actually up compared to the prior year, noting that 56 percent of consumers had increased their sports nutrition supplement use within the prior six weeks," highlights Lindsey Toth, associate director global product management, Lonza Capsules & Health Ingredients. "We've seen this growth taper going into 2021, with 34 percent of consumers still increasing sports supplement use, yet we still see that most users who increased their usage remain committed to their new higher-dose routine. More people are looking for sports nutrition supplements, and they're looking to take them in higher amounts," Toth continues.

Meanwhile, according to the PLT survey, more than half of the respondents would switch from their current pre-workout that did not have a tailored energy profile to one that did. The survey found that 92 percent of respondents felt that a product with a personalized energy profile would be worth paying more for. "As a result, targeted release energy – at a relatively small incremental cost – is one of the most effective things you can add to a sports nutrition product to have a

dramatic impact on perceived value and purchase preference," Fink adds.



### Emergence of nootropics

According to Innova Market Insights' data, nootropics are gaining traction in both the dietary supplement and the broader food and beverage markets, with "nootropic" claims growing at a rate of 62 percent per year on average. In this space, memory, mental focus, alertness, clarity, performance, stamina, antistress, anxiolytic, calming and soothing properties are among the other significant claims. "While nutrition for physical energy and stamina has long been in demand, the link between nootropics and brain health is becoming more widely accepted. Consumers are more interested in brain health and ingredients that support cognition," Bane states. "Nootropics currently exist across all major food and drink sectors, whereas previously, it was only found in specialized supplements like tablets and capsules for a niche market. Now, it's becoming mainstream with global brands launching products into bars, RTD, gummies and powders that contain cognitive-boosting ingredients."

By Nicole Kerr

### Kappa Bioscience uncovers vitamin K2's unique role in immunity and COVID-19

23 Jul 2021 Nutrition Insight

Vitamin K2 is poised to emerge "as one of the most important supplemental nutrients," following the latest research on its role in immunity and COVID-19. This is according to studies backed by Kappa Bioscience, which found that deficiency in either vitamin D or vitamin K2 increased the risk of COVID-19 infection. The research also revealed more severe outcomes if COVID-19 patients are deficient in both nutrients.

"The independence these vitamins

have from each other in COVID-19 infections – independent of all of the other variables, such as age, gender and comorbidities – suggests vitamin K2 plays a unique role in immune health and function especially within COVID-19 infections," Dr. Andrew Myers, naturopathic physician, tells NutritionInsight. Myers plays an integral role in coordinating the Kappa Bioscience research conducted from the US. He affirms the findings are "breakthrough science," commenting on the Kappa Bioscience-funded work led by Dr. Grace McComsey. She is an infectious diseases specialist, vice president of research and associate chief scientific officer at University Hospitals in the US.

Myers and McComsey recently co-authored and published Simplifying the COVID puzzle: How two essential vitamins fortify the immune system. "The many studies on vitamins D and K published during the pandemic represent new knowledge that has to be spread. Many of us know of the key roles played by vitamin D, but K2 benefits remain overlooked. I believe vitamin K2 is a 21st-century ingredient," McComsey states. Independent vitamins that go best together For Myers, the current body of research suggests that vitamin D3 supplementation should always be accompanied by vitamin K2. This is due to their synergistic benefits to help diminish the inflammatory response to COVID-19 and help the body to maintain its health and function. He details that vitamin D activates immune cells at the beginning of an infection and helps to block a key inflammatory chemical mediator – nuclear factor (NF) kappa B. Meanwhile, the primary modulator of inflammation is vitamin K2. "Vitamin K2 has been shown to inhibit NF kappa B as well as other interleukins that lead to the cytokine storm in COVID-19 infections."

### Moving calcium

Vitamin K2 and D3 have



demonstrated an important interplay when it comes to the body's calcium metabolism. "The synergistic impact of these two nutrients is undeniable. And with increasing dosages of vitamin D3, it is imperative that vitamin K2 is included to ensure that calcium is moved to the bone and not to the soft tissues like the arteries or lungs," says Myers. Keeping calcium deposits away from the lungs could be crucial in the case of COVID-19. This is one of the ways researchers believe vitamin K2 supplementation may reduce severe outcomes. "Vitamin K2 protects the lungs from damage by helping to reduce calcium impregnating of elastin fibres. It also helps to reduce the risk of thrombo-embolism in the vascular network," comments Myers.

### Only a matter of correcting a deficiency?

Several studies have established a link between COVID-19 outcomes and vitamin K status. Last month, vitamin K levels were found to be predictive of COVID-19 mortality. However, the question of supplementation's efficacy remained to be seen with further research. Kappa Bioscience has now debuted the first clinical trial exploring the potential benefits of vitamin K2 supplementation for COVID-19 patients. The trial uses the company's vitamin K2 as menaquinone-7 (MK-7) K2Vital and is expected to give results this winter.

By Missy Green



# REGULATORY NEWS

## No more multibuy: UK government to ban unhealthy food promotions

22 Jul 2021 Nutrition Insight

The UK government will restrict the in-store promotion of foods high in fat, sugar and salt (HFSS) from October 2022 in a bid to slash skyrocketing obesity weights.

However, industry experts tell NutritionInsight that loopholes



could remain, including for small retailers or in terms of portion sizing. Businesses with 50 or more employees will now have to phase out their offering of multibuy promotions such as “buy one get

one free” or “three for two” offers on HFSS products.

Less healthy promotions will no longer be featured in key locations, such as checkouts, store entrances, aisle ends and their online equivalents. Free refills of sugary soft drinks will also be prohibited in the eating-out sector. As part of the regulations, the government will provide local authorities with the option of issuing civil penalties for non-compliance with the promotions’ restrictions. -The measures, which were announced at the start of the year, are estimated to accrue combined health benefits of approximately £60 million (US\$83 million) over the next 25 years.

### Room for improvement

Many high fat and sugar products are sold in smaller outlets and contribute to health issues, according to Clare Thornton-Wood, registered dietitian and British Dietetic Association (BDA) spokesperson. “It would be good to consider if the policy could be applied to all outlets regardless of



size.”

“While we understand the limitations for small stores in terms of location-based promotions, we did not see the reason to exempt small businesses from that type of price promotion on HFSS food and drink,” adds Barbara Crowther, co-

ordinator, Children’s Food Campaign at Sustain. She would also like to see a strong commitment to ongoing review and potential future extension of the restrictions in terms of the product categories exempted,

and also to monitor other forms of price promotion that may take the place of multibuy deals.

Meanwhile, Thornton-Wood stresses that nutritional scores should be kept under review to ensure that the 100 g benchmark continues to be an appropriate benchmark.





the scientific community and industry encouraged to weigh in.

“All scientific comments received during the public consultation will be taken into account to finalize the opinion and will be considered in their scientific merit,” Silvia Valtueña, senior scientific officer in EFSA’s nutrition unit, tells NutritionInsight.

**Informing future policy?**

Valeriu Curtui, head of EFSA’s nutrition unit, also emphasizes that the draft assesses solely scientific evidence and does not constitute future policy recommendations or public health guidelines. “Those are the responsibility of national public

health authorities and international bodies.” However, the draft opinion does contain several recommendations for research to inform the possible setting of an upper limit (UL) for dietary sugars in the future. The draft stems from a request from Denmark, Finland, Iceland, Norway and Sweden to update a 2010 assessment of sugar.



**Too strict?**

The UK’s Food and Drink Federation (FDF) is “disappointed” that the government is restricting promotion. “Nonetheless, we are pleased to see that the Government has listened to industry and has delayed the implementation period by six months to October 2022,” says chief scientific officer Kate Halliwell.

This will allow businesses more time to adopt the upcoming restrictions. “However, we still await vital information, including detailed guidance on product categories captured by the restrictions and updated guidance on the Nutrient Profile Model.”

The government says it will work with businesses, trade associations and local authorities to ensure they are supported in implementing the new requirements ahead of them coming into force. This will include sharing draft guidance with industry and local authorities to provide further clarity on how these restrictions will need to be implemented in practice.

**Supporting healthier lifestyles**

The measures are part of a pandemic-spurred UK push toward healthier weights and overall lifestyles. The government will also prohibit HFSS advertisements on

TV before 9 p.m. and remove them from online marketing entirely. “We want to support everyone to eat healthier foods more regularly. This starts with helping supermarkets and

manufacturers promote healthier food choices lower or free from HFSS to support families to make healthier choices,” says public health minister Jo Churchill. Obesity is one of the country’s biggest health crises as almost two-thirds (63 percent) of adults in England are overweight or living with obesity. Additionally, one in three children leaves primary school overweight or obese.

By Katherine Durrell

**Limit sugar intake, concludes EFSA’s draft safety opinion Industry will weigh in after EFSA is unable to set an upper limit**

23 Jul 2021 Nutrition Insight

The European Food Safety Authority (EFSA) has published its draft opinion on the safety of dietary sugars, which confirms various links between the intake of different categories of sugars and the risk of developing chronic metabolic diseases and dental caries.



A public consultation will now run until the end of September, with interested parties from





Linda Granlund, director of the division for prevention and public health, Norwegian Directorate of Health, says: “We will use the extensive scientific findings to update our national food-based dietary guidelines once the opinion is finalized.” She also encourages nutrition experts in Norway and beyond to comment on this draft to assist EFSA’s scientists.

#### Limiting added and free sugars

The requester countries specifically asked if it would be possible to set a UL, or a science-based cut-off point for total dietary sugars, below which consumption would not cause health problems. However, EFSA has provisionally concluded it is not possible to set such a threshold. This is because all the “dose-response” relationships (between intake of sugars and risk of adverse health effects) were positive and linear. This means that the higher the sugar intake, the greater the risk of adverse effects.

Therefore, the scientific evidence supports recommendations in Europe to limit the intake of added and free sugars. The draft opinion also contains extensive scientific advice on the relationship between the intake of different categories of sugars and their sources, as well as the risk of developing chronic metabolic diseases, pregnancy-related conditions and dental caries.

#### Industry assesses conclusions

Some movers in the sugar industry have already confirmed they will be

sharing their opinion. The European Association of Sugar Manufacturers (CEFS) will now look into how EFSA has taken into account available scientific studies and how they – on this basis – have reached conclusions. “We will also pay attention to how the conclusions with regard to sugars are put into context and how the other risk factors to the various assessed endpoints are referred to in the draft opinion. This is important for a proper understanding of the scientific advice and any actions derived from it,” states the organization.

A CEFS spokesperson also tells NutritionInsight that safety is not an issue for the sucrose that CEFS members produce from EU sugar beet. “Sugar is a standardized product and is strictly regulated by an EU directive.”

Meanwhile, Germany’s sugar association, WVZ, says it will focus on how EFSA assesses the current scientific data situation and on what basis the assessment is based. It will also examine the extent to which EFSA has placed sugar consumption in the context of overall nutrition. “In this context, it is relevant whether other risk factors were also included in the assessment. This is crucial for the conclusions that can ultimately be drawn from the final version of the EFSA opinion,” states the association.

#### A major undertaking

EFSA’s draft opinion is the result of evaluating over 30,000 publications. “The literature was scrutinized to identify eligible studies linking intake of sugars and risk of chronic metabolic diseases, pregnancy-related effects and dental caries,”

explains Valtueña. Some 120 key studies were identified as pertinent to the assessment. In addition, the challenges were related to the complexity of the exposure (different categories of sugars and their sources), and the high number of diseases to be assessed, which are also interrelated.

Valtueña explains that the mechanisms by which dietary sugars can cause dental caries are well known. “Dietary sugars diffuse into the dental plaque where they are metabolized by plaque microorganisms to organic acids (mostly lactic acid). These diffuse into the enamel, causing sub-surface demineralization and initiating the caries process.”



Meanwhile, dietary sugars could promote excess energy intake leading to positive energy balance and body weight gain owing to their hedonic properties. “Obesity is a well-established risk factor for several chronic metabolic diseases. There also specific mechanisms by which sugars could increase blood glucose and blood lipids, and by which fructose increases uric acid levels.” Sugar reduction has been a major theme over the last year, with Innova Market Insights revealing that 91 percent of consumers are “at least a little” influenced by sugar reduction claims.

By Katherine Durrell

LESS SUGAR