



# FOOD, NUTRITION & SAFETY MAGAZINE

PFNDAI

BULLETIN SEP 2023

## **CARDIOVASCULAR DISEASES: THE EVOLVING LANDSCAPE OF RECOMMENDATIONS AND LIFESTYLE INTERVENTIONS**

Ms Fatema Noorani and Dr. Agatha Betsy



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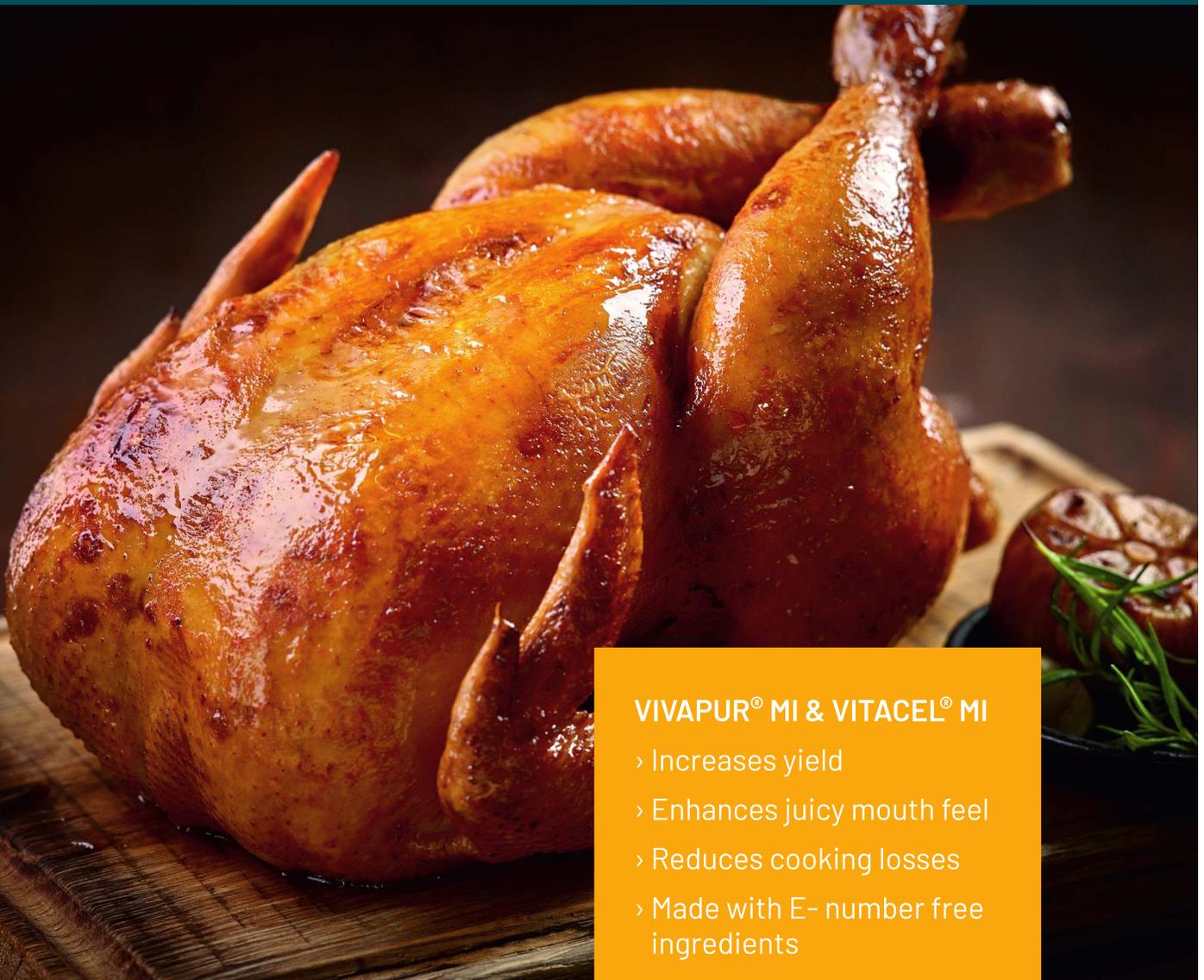
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## Dear Readers,

*It gives me immense pleasure to communicate with you after taking over as “Executive Director” from 1st September 2023. I have taken charge from a magnificent person “Dr. Jagadish Pai” who spearheaded this great organisation for almost nineteen years. Under his leadership PFNDAI has come to the centre stage of food industry as a voice of food industry. The activities help support members in their technical, regulatory issues. It has brought industry, academia, research, and students on a common platform of sharing knowledge and ideas.*

*The best activity is Bulletin which cover topics of interest to all and this being online, is widely circulated and appreciated. Webinars and Nutrition awareness activities are nice platform for sharing information and current issues. Scholarships for deserving and needy students of Food science encourages them for further studies. Recently started “E Magazine” is an excellent opportunity to young and creative minds where students of food Science and Nutrition write articles.*

*While I take over from him with such a great legacy of innumerable activities, I appreciate that a challenging task is ahead of me. However, you will be happy to know that Dr. Pai has graciously agreed to continue as an editor of PFNDAI Bulletin which is a major activity makes my task little easier.*

*With his blessings and support am sure that I will be able to shoulder this new responsibility effectively and efficiently. I am confident that I will meet everyone’s expectations of maintaining the high standards and scientific culture set by him for all the activities. Look forward for your active participation as usual!*

**Thank you**



**Dr Shashank Bhalkar,**  
**Executive Director, PFNDAI**

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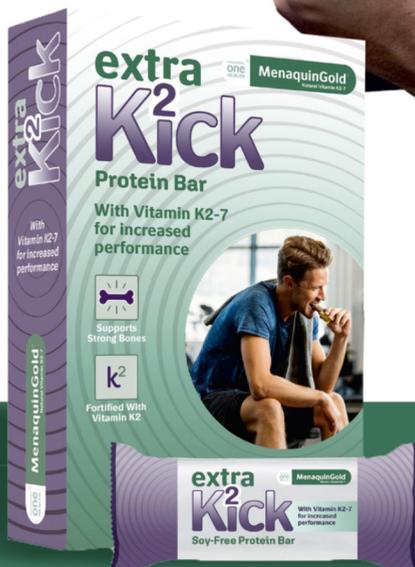
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# EDITORIAL

Dear Friends,

It has been some time since I took the responsibility of running this Association and now the time has come to hand over the baton. It does not mean the job I undertook is completed but just like a space rocket fires another engine and gets rid of some used up part and with new vigour it continues its journey to the target. The mission goes on. Dr Bhalkar is the next person to carry the baton forward and continue the mission with new energy.

Time and again various surveys have shown that deficiencies among Indians exist, both for macro and micronutrients. Among macro, we may name protein and dietary fibre part of carbs. There are many vitamins and minerals deficient in various groups.

At present, if we cannot bridge the gap by choosing proper foods in a diet, then we must rely on dietary supplements. However, this is not the ultimate solution. We must have better diet.

Currently, we eat most of our daily diet through home cooked food and a lesser through food products and institutional food including restaurants and ordered food and fast food. However, as our lifestyle is changing we rely more and more on the outside foods, so we must try to make those foods not only more nutritious but at the same time fortified so when that proportion becomes major we should not have the deficiency gap widened.



This is one of the reasons that food technologists and nutritionists have come together in this association so they understand the strengths and weaknesses of each other and try to provide opportunities and caution each other about the threats.

This kind of joining hands is not just seen here in our association but elsewhere also including educational institutions where earlier departments of nutrition and of food technology were separate, are either merging or working in close cooperation to help each other.

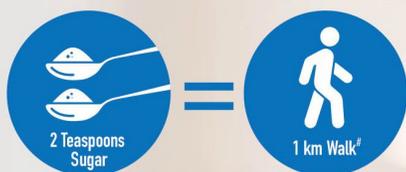
There are many misconceptions among both but only through dialogue we will be able to dispel them. Food must not only be nutritious but also be tasty and enjoyable.

The future is going to bring challenges in the form of global warming and other calamities, natural or man-made. We will need all the resources and minds to tackle them if we have to survive and win over the deficiencies and hunger.

I will continue for some time as Editor and together with Dr Bhalkar, will need your help and support to carry out various activities aimed at creating awareness about food, nutrition, health and safety, so we can overcome the problems. Thanks & regards

Prof Jagadish Pai,  
Editor, PFNDAI

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# NUTRITION INTERVENTION



AUTHOR

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

We rarely consider expenditure on public health preventive care as a business investment since we are certain there will be no returns. This is not true.

If reasonably well executed and monitored, public health, particularly in nutrition, sanitation, immunization etc. will result in improvement in the nations GDP. I would refer to a world bank publication titled "An investment framework for Nutrition" by Meera Shekar et al, 2017. This information has been taken from that extensive report.

A well-founded investment is a well-thought-out and long-term sustainable investment that usually generates a return on your capital over a longer period. Prior to investing we need to define our Goals, the Risks and the expected Returns clearly.

The question always asked by investors - What does investment in public health do?

It is intended to ensure better, longer lives for the greatest number of people (Bloomberg Philanthropies). Prior to investment one must work out the benefit to cost ratio, the need for capacity building to execute the

project (also needs considerable inputs and investments), perform a cost - effectiveness analysis etc.

There are two major types of Nutrition related investments.

**1. Nutrition Sensitive intervention** are those that have an indirect impact on nutrition and are delivered through sectors other than health, such as the agriculture; education; water and sanitation, and hygiene sectors. Examples include biofortification of food crops, water and sanitation infrastructure improvements.

**2. Nutrition-specific interventions** are those that address the immediate determinants of child nutrition, such as adequate food and nutrition intake, feeding and caregiving practices, and treatment of disease. Examples include promotion of good infant and young child nutrition, micronutrient supplementation, and deworming.

The WHO's targets for such investments are a) Stunting prevalence to be reduced by 40%, b) Anemia in women to reduce by 50% c) Exclusive breast feeding in infants up to 6 months raised to minimum of 50% and d) Bring down wasting or acute malnutrition in under 5 children to less than 5%.

The economic benefit of reducing stunting is estimated to increase

the GDP of African and Asian economies by 4 to 11% (Horton and Steckel 2013). In numbers, if the world were to invest \$70 billion over 10 years, 65 million cases of stunting in children and 265 million cases of nutritional anemia would be prevented. 91 million more kids under the age of 5 would be treated for acute malnutrition and wasting, and if 105 million babies could be exclusively breast fed till 6 months after birth overall 3.7 million child deaths could be prevented.

\$7 billion / year for nutrition interventions is much lower than \$500 billion for agriculture subsidies (Potter 2014), and \$540 billion/year on fossil fuel subsidy (IEA 2014). \$ 70 billion in 10 years amounts to just Rs 2.30 / day / child.

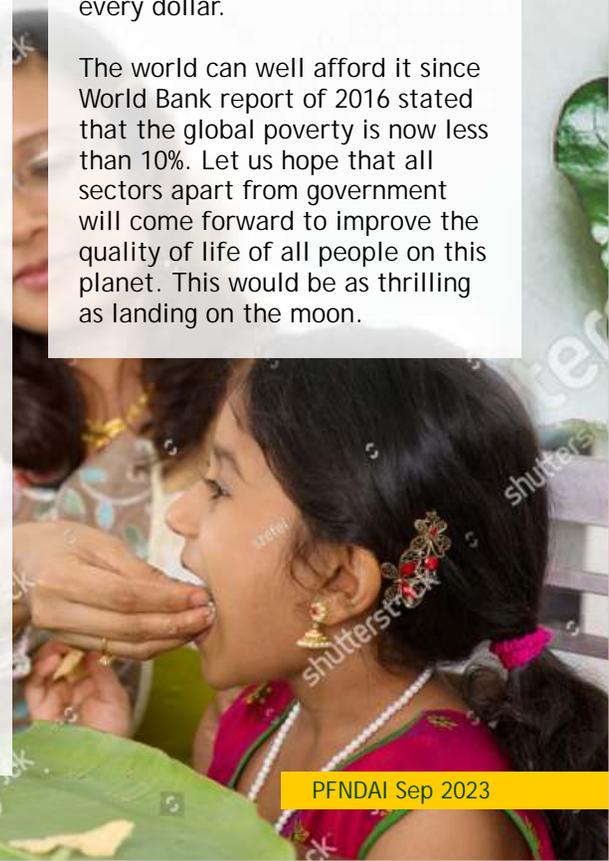
Finally, the value of the benefits for every dollar invested in these programs are.

Stunting prevention = \$10 for every \$ invested

Anemia mitigation = \$ 12 for every \$ invested

Exclusive breast feeding is a whopping \$35 per dollar invested. Wasting mitigation yield \$4 for every dollar.

The world can well afford it since World Bank report of 2016 stated that the global poverty is now less than 10%. Let us hope that all sectors apart from government will come forward to improve the quality of life of all people on this planet. This would be as thrilling as landing on the moon.



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# REGULATORS CAN BE PROCESS INNOVATORS

AUTHOR

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



Innovations are not only for product; they can be for process too. For food businesses, the greatest challenge in product innovations is with navigating rigid procedures and interwoven administrations. The latter occurs when more than one department is involved. Going back and forth happens when jurisdictions are unclear. Though a risk-based framework has enough space for innovating safe food products, bureaucratic processes are challenging. Creating food from cultured animal cells taken from livestock, poultry and seafood is an emerging innovative area in food science and technology. Several countries are rushing to create the first geographical market. Even regulatory agencies have a role to play.

The US FDA's voluntary pre-market consultation process for evaluating safety of food made from cultured animal cells is a beacon of hope that bureaucracies come up with new ideas. Innovating the path

to market two fold. One, the pre-market consultation allows developers get involved early on with FDA on a product-by-product basis and informs them of issues they must consider to meet requirements of law for safe food.

The consulting resolves all relevant safety concerns in production, processes and product quality. Thereafter a 'no questions at this time', letter from US FDA, informs the manufacturer that the specified cultured cell material resulting from the defined process is as safe as compared to foods produced by other methods. The 'no questions letter' paves the way to market. When production procedures or ingredients relevant to safety of the food change it is recommended that FBOs consult FDA. FBOs are mindful that the ultimate responsibility of placing safe food on the market lies with them.

Second, and even better, while manufacturers are scaling up to commercial viability, FDA is closely coordinating with other departments, USDA-FSIS through formal agreements to make their jurisdictions clear to businesses and possibly working within the same process flow. Streamlining inter departmental

consultation process proactively is seen as critical for "ease of doing businesses". Both agencies work to ensure products will meet all applicable FDA and USDA-FSIS requirements, before they enter the market. A prime example of an "everything done here" process. Process innovation lies in the "one table" sit down for whole of government. All at once, the process becomes a project.

The FDA process should not be mistaken for pre-market approval that occurs under a novel food (non-specified food) or under a licensing process in India. The 'no questions letter' signals a new approach to 'let's get the work done' quickly and efficiently. Even though FSSAI or EFSA rely upon the same scientific risk assessment framework, the US FDA approach is a refreshingly better way of engaging with each other.

Working together can happen when the regulator and business believe that the country's economic growth is a shared vision. Processes ensure diligence on both sides and become challenging when viewed as granting permissions. The 'one table' sit down, instead of passing files along corridors is an innovative idea worth pursuing.

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# CARDIOVASCULAR DISEASES: THE EVOLVING LANDSCAPE OF RECOMMENDATIONS AND LIFESTYLE INTERVENTIONS



AUTHORS

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Marico Ltd.

In recent years a huge transition is observed from diseases due to undernutrition and infections to now non-communicable (NCDs) owing to improper lifestyles.

According to WHO (2023), NCDs lead to about 41 million deaths/y (74% of total deaths) with most occurring earlier than 70y. Globally, cardiovascular diseases (CVDs) (including heart attacks and strokes) account for maximum deaths (17.9 million) followed by cancer (9.3 million), chronic respiratory diseases

(4.1 million) and diabetes (2 million including deaths by kidney diseases).

An ever-rising burden of NCDs is present and India is one of the most populated countries, may also be the largest contributor of the world's health status. ICMR evaluated the population in "India: Health of the Nation's States" and estimated that the proportion of deaths due to NCDs has steeped from 37.9% in 1990 to 61.8% in 2016 (Kumar et al, 2020). Furthermore, Indians have increased inherent biological

risk due to lower body weight but higher abdominal fat. The risks are further aggravated by the population level changes like demography, nutrition, environment, sociocultural and economic parameters (Kalra et al, 2023).

The INDIAB study reported that achievements of adoption of lifestyle modification is suboptimal in India.

According to CDC, a risk factor is defined as an aspect of personal behaviour, an environmental determinant or hereditary characteristics associated with an increase in a health condition. The biological risk factors include obesity, hypertension, raised blood glucose levels and dyslipidaemia, whereas behavioural risk factors include poor dietary habits, physical inactivity, use of tobacco and alcohol. Emerging risk factors include high homocysteine levels, air pollution, psychological health and higher sensitivity to C-reactive protein (CRP) (Kumar et al, 2020).



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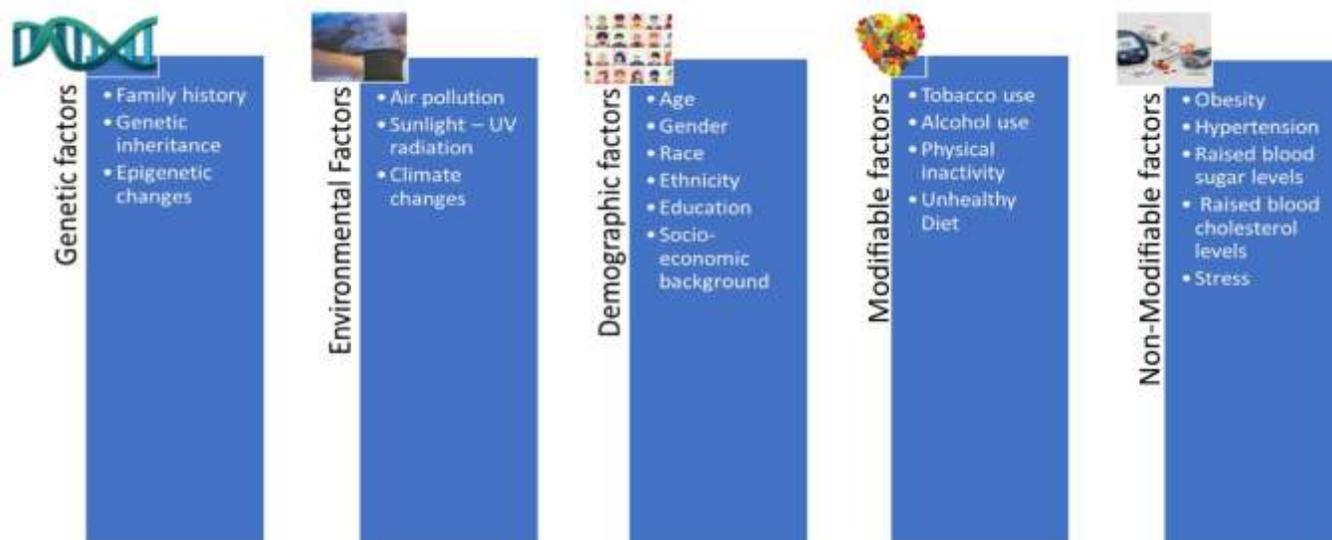
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Fig 1: Risk Factors for Non-Communicable Diseases



Largest numbers of nutrition-related deaths globally are attributable to insufficient intakes of protective foods including fruits, whole grains, vegetables, legumes, fish, nuts/seeds and excess consumption of ultra processed foods (Mozaffarian, 2023). Interventions to achieve positive lifestyle changes may improve outcomes for non-modifiable risk factors.

In view of CVD, early markers include genetic polymorphism defined as change in DNA sequence. Emerging risk factors are coronary artery calcium score, elevated hsCRP and homocysteine levels,

carotid intima media thickness, presence of lipoprotein (a), apolipoprotein (b), myeloperoxidases, F2-isoprostanates, insufficient vitamin D, and ankle brachial index. These risk factors are measurable and may improve cardiovascular risk prediction.

**Obesity - A Rising Epidemic and a major risk factor for NCDs**

According to WHO, obesity/overweight is a pivotal health risk factor accounting for 2.8 million global mortality rates. A report by NCBI it was estimated by 2030 about 28% of the global overweight population will be Indians.

Similarly, 'Indian Obese' will account for 5% of the world obese people (NFHS 5).

**The Burden of Cardiovascular Diseases: Manifestation of Indian peculiar genetics and epigenetics**

CVDs are the leading cause of deaths globally accounting for 17.9 million deaths. Although, CVDs affect Indians a decade earlier than the Western population. According to the results of Global Burden of Disease Study, the age standardized CVD death rate in India is higher than global average- 272/lakh against 235 (Kumar et al, 2020).

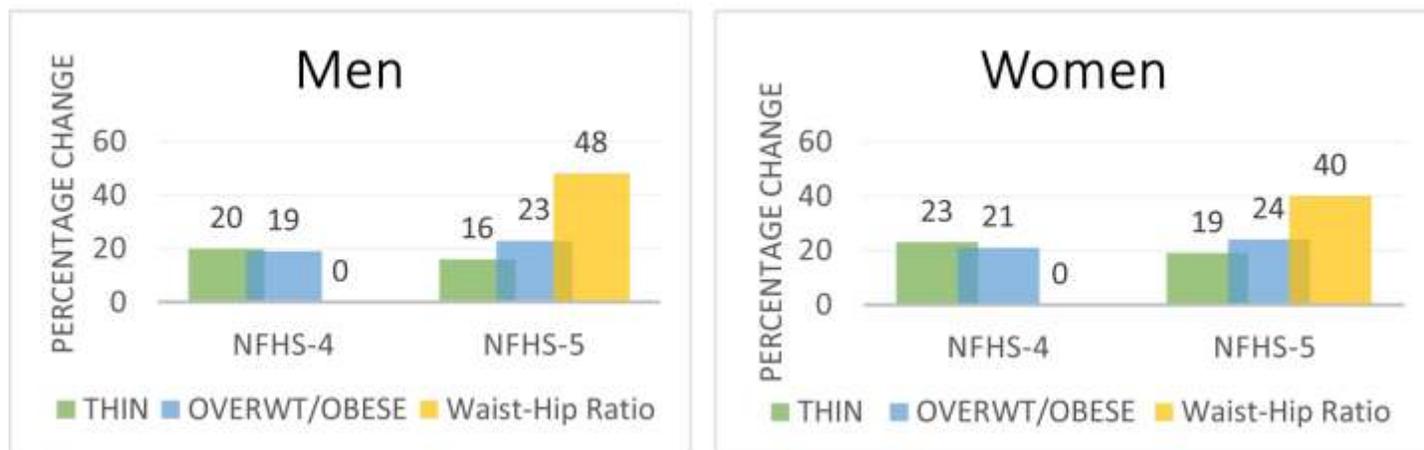


Fig 2: Percentage weight change in population: NFHS-4 vs NFHS-5



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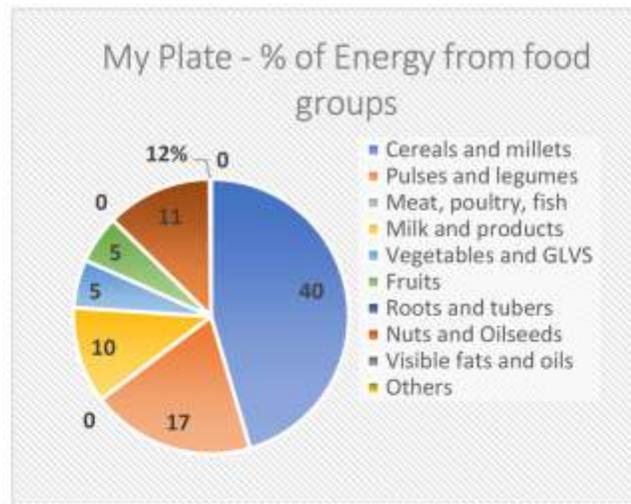
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Also, the individuals with hypertension are likely to double by 2025 (from 118 million in 2000 to 213.5 million) (Dorairaj et al, 2018, Prabhakaran et al, 2016). ICMR-INDIAB study reported majority of Indians suffered from at least 1 lipid abnormality, and only 21% of the studied population had normal lipid ranges.



and slows down gastric emptying. Thus, helping lower the risk of heart disease, stroke, obesity, and type 2 diabetes.

The possible mechanism of action is through reduction of glucose absorption and oxidative stress, fermentability and an inflammatory response (Marhuenda et al, 2022). Also, it helps attain satiety,

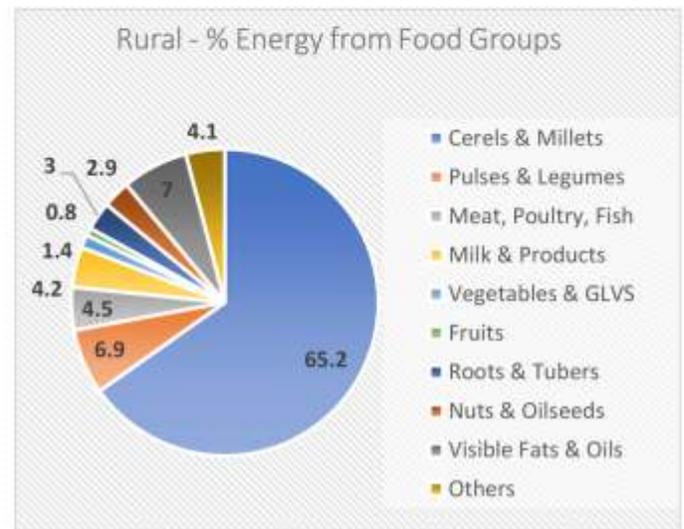
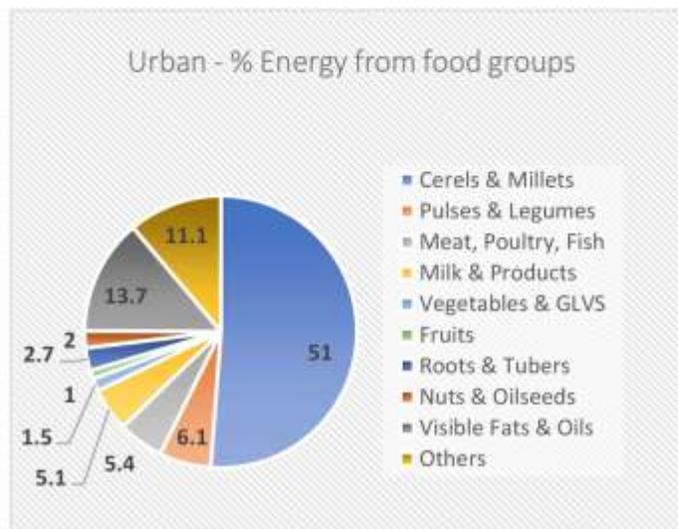


Figure 3: (Recreated) % Energy from Food Groups - My Plate Recommendations, Urban and Rural Population (What India Eats)

### Nutritional Recommendations to manage CVDs

Food based dietary guidelines are always simple and easy to follow. Several dietary guidelines are recommended globally by health authorities like [European Society of Cardiology Health Impact Pyramid](#), [American Heart Association \(AHA\)](#), WHO. [Health and Dietary Score by PURE](#) (Prospective Urban Rural Epidemiology).

The What India Eats report by ICMR, suggests that there is an imbalance in food groups

contributing to energy intake. The diet needs to be looked at with careful consideration with a holistic approach.

### Macronutrients:

**Carbohydrates:** Eat more complex and less simple carbs ICMR recommends that carbohydrates should make up about 50-60% of the total calories. Compared to simple sugars, complex carbohydrates exhibit beneficial properties owing to the higher fibre content and phytosterols. Dietary fibre can help in decreasing total and LDL cholesterol (LDL-C) concentration, blood pressure

control calorie intake, and weight management. Greatest benefit is observed at 25-29 g per day, and WHO **strongly** recommends an intake of 25g/day of **dietary fibre** as natural fibre from WG fruits and vegetables.

### Protein: Plan more Plant based protein sources in diet

Protein is linked to better heart health when consumed from plant sources. They are better for you as they do not contain saturated fats, provide dietary fibre and other beneficial nutrients.

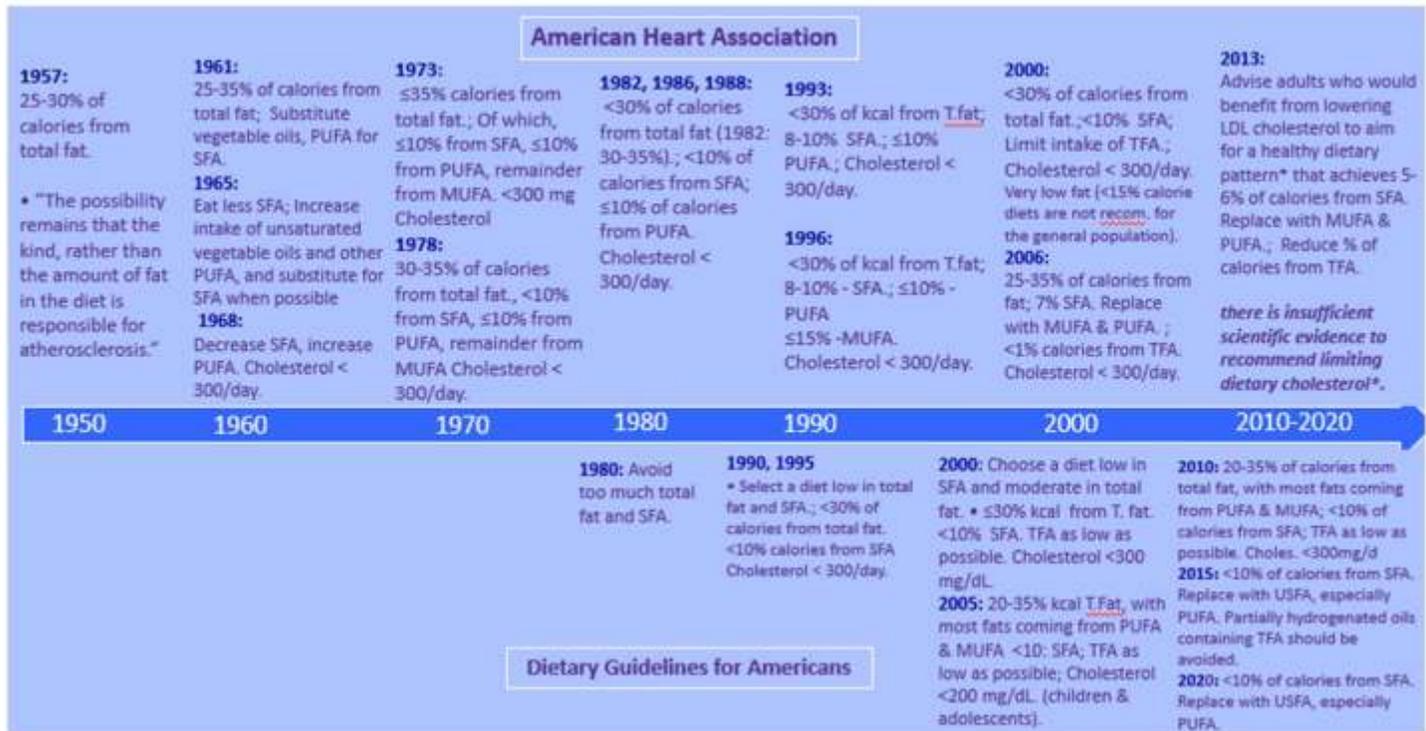


Fig 4: Shift in Dietary Fat Recommendations - Total Fat to Fat profile  
 Ref: : Recreated from AHA/ACC Guideline on Lifestyle Management to Reduce Cardiovascular Risk

Including beans in a heart-healthy diet plan may help in improving blood cholesterol and help keep you feeling full longer. Recent WHO guidelines (2023) recommend replacement of saturated fat with plant-based protein sources for better heart health outcomes.

**Dietary Fats: Fat profile is more important**

Dietary fats have had a bad reputation since the 1980s with the phenomenon of "Diet-Heart Hypothesis".

However, since then, there is a huge transition in the way dietary fat is perceived. The focus has shifted from total fat to the type of fat consumed. Today, the recommendations for saturated fat (SFA) across various health authorities namely, AHA, ICMR and WHO (2023) is <7-10%E (% energy) and the recommendation for PUFA is 6-11%E and MUFA is by

difference of total fat from energy consumed.

However, **trans fats (TFAs)** being the bigger culprit than SFA, the recommendations by ICMR are stringent and should be consumed <1%E. TFAs not only increase LDL-C, but also decrease HDL cholesterol. They may be naturally occurring from ruminants or industrially produced. Industrial process converts liquid fat into solid through hydrogenation which leads to the formation of partially hydrogenated vegetable oils (PHVO) which are significant source of trans-fat. High consumption of TFAs was globally attributed to 5, 37, 000 deaths due to coronary heart disease. High trans-fat intake (>1%/E) significantly increases the risk of death from any cause by 34%, the risk of CHD death by 28%, and the risk of CHD occurrence by 21%. WHO has actioned the

**REPLACE** program to provide strategic approaches to eliminate industrially processed trans-fat by 2023 through solid monitoring systems and creating awareness. In India, the apex food regulator, FSSAI has undertaken the pledge "**Freedom from Trans-fat @ 75**" to eliminate trans-fat from the diet in a phased manner. To achieve this, stringent regulations were implemented like "All vegetable fats should not have >2% of TFA by mass of total fats in the product. Through the Eat Right India Movement, FSSAI is also actively working towards educating consumers about trans-fat.





Fats have important roles and comprise of SFA, PUFA and MUFA. Research proves that the replacement of SFA with MUFA and PUFA led to better heart health outcomes. When PUFA rich oils were tested against SFAs, a reduction in serum cholesterol, LDL-C, triglycerides, TC: HDL ratio and, CVD events was noted.

Moreover, **Omega 3 PUFA** as EPA and DHA, have shown various advantageous properties at 250mg to 1 g/day (Marhuenda et al, 2019). Although it is important to note that SFAs raise large LDL particles in contrast to smaller LDL particles, typically linked with adverse CVD outcomes (Forouhi et al, 2018). The Evidence-Based Guidelines for CVD recommends the consumption of non-tropical plant oils (olive, safflower, corn) rather than animal fats (butter and lard) or tropical oils (e.g., coconut, palm kernel) (Popular Dietary Patterns by AHA,). Choosing an oil with a good fatty acid profile is also important, therefore combinations or blends of oils may be a good choice. Moreover, antioxidant naturally present in oils, like **Oryzanol** in Rice bran oil help in oxidative stability and scavenge ROS (free radicals) preventing oxidation of LDL-c - an important risk factor for CVD and further preventing the plaque formation.

### Micronutrients: Consume more ingredients-based micronutrients

Vitamins are usually within adequate ranges among healthy individuals; however, it has been observed that the population developing CVDs could be deficient in vitamins.

#### Water soluble vitamins:

thiamine and folic acid deficiency may be associated with the risk factors for cardiovascular disorders (Shah et al, 2021). Riboflavin (B2) depletion was associated with anaemia and elevated homocysteine levels (Balasubramaniam et al, 2019). Vitamin C acts as an antioxidant and deficiency can be causative of increased LDL oxidation, however, its role in CVD outcomes is inconclusive (Barteková et al, 2021).

**Fat-soluble vitamins:** Vitamin D deficiency has been associated with the pathogenesis of CVD likely in inflammation, thrombosis, and the renin angiotensin system. However, more research is required to establish the role (Shah et al, 2021). Vitamin E, an antioxidant helps in reducing oxidative stress in the body and Vitamin K possesses anti-inflammatory properties and obstructs vascular calcification through the matrix Gla protein (Aggarwal et al, 2022). Hence, ICMR and WHO recommend consuming at least 300g of vegetables and 100g of fruits every day.

Minerals are another set of micronutrients that play major roles in the physiological functions of the human body.

**Sodium** is a major cation present in the extracellular fluid. However, high sodium consumption (>2000mg/day or >5g salt/day) and insufficient potassium intake (<3.5 g/day) contribute to higher blood pressure and increase the risk of heart disease and stroke. Indians consume as high as 12g -14g salt per day, which may be a concern. WHO recommends, a low salt intake eventually helps reduce the risk of CVDs, CHD and stroke. The lowest risk range (i.e., "sweet spot") for sodium intake is at -3 to 5 g/day, with respect to risks of CVD and death at lower and higher levels. However, current evidence indicates that most people globally consume about 3 to 5 g sodium per/day (10gsalt). Research has also indicated adverse health outcomes with sodium intakes below 3 g/day (Mente, 2021).

**Potassium**, an essential intracellular cation exhibits a blood pressure lowering effect through various mechanisms and affects vasodilatation and reduces sympathetic activity. A manageable ratio of 1:1 for sodium and potassium is recommended.

**Magnesium** plays a role in CVH acting as an antioxidants and anti-inflammatory against hypertension. Studies have suggested that 150 mg/day of magnesium reduces the risk of CVD. Consumption of **Calcium** as per the recommendation of 1000 mg/day may be beneficial in reducing hypertension through vaso relaxation and improvement in serum lipids (Mohammadifard et al, 2018).

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### Physical Activity: Keep it moderate but regular.

According to the American Heart Association (2023), regular physical activity is a cornerstone for better cardiovascular health. Physical activity is inversely associated with blood pressure and hypertension status. Evidence suggests low activity levels may be associated with higher fasting glucose levels or diabetes. Adults should engage in at least 150 minutes/week of moderate-intensity or 75 minutes/week of vigorous-intensity physical activity (AHA, 2019).

A meta-analysis (N=17 studies) demonstrated a significant inverse association between daily step count with more the better over the cut-off point of 3967 steps/day for all-cause mortality and 2337 steps for CV mortality. It was shown that a 1000 vs 500 step increment correlated with a reduction of 15% and 7% all-cause mortality respectively (Banach et al, 2023).

In conclusion, lifestyle habits including dietary patterns and physical activity, on a regular basis, profoundly impact the prevalence and management of CVD. Continuous Education, including observing occasions like the World Heart Day, to

bring relevant behaviour modification for a sustained impact is the need of the hour!

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# THE HEALTH MIRACLE- MORINGA OLEIFERA



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In addition to the nutritional benefits, the wide variety of phytochemicals in Moringa makes it therapeutically useful. It has been traditionally used to address several

Moringa oleifera(MO) is a vegetable plant/tree of which each and every part offers innumerable health benefits. It is also referred to as Drumstick plant, widely seen across India. Moreover, in the current situation of climate change and high demand for drought resistant plants of nutritional importance, Moringa oleifera is certainly the most suitable option for cultivation.

The high micronutrient content in Moringa including iron, calcium, vitamin C, carotenoids etc., makes it a cost-effective option to address the highly prevalent micronutrient deficiency across developing countries like India (Table-1). In comparison with various foods, Moringa scores high on several nutrients i.e. 7 times more

vitamin C than oranges, 10 times more Beta Carotene than carrots (Beta Carotene is a precursor of Vitamin A), 17 times more calcium than milk, 9 times more protein than yoghurt, 15 times more potassium than bananas and 25 times more iron than spinach (Rockwood, 2013).

clinical conditions including neurological diseases, paralysis, asthma, diabetes, blood pressure, diarrhoea, fever, cough, cholera, spasms, enlarged liver and spleen, infection and ulcer, and inflammation, and also to promote wound healing (Sultana, 2020, Table-2).

**Table 1: Nutritive value of Moringa leaves and Pods**

Energy & Nutrients	Moringa leaves (Fresh)*	Dry Moringa Leaves#	Leaf powder#	Pods*
Energy (Kcal)	282	329	205	123
Carbohydrate (g%)	5.62	41.2	2.3	3.76
Protein (g%)	6.41	29.4	27.1	2.62
Fat (g%)	1.64	5.2	2.3	0.12
Iron (mg%)	4.56	25.6	28.2	0.73
Calcium (mg%)	314	2185	2003	33.3
Potassium (mg%)	397	1236	1324	419
Beta Carotene (mcg)	17,542	21,420**	NA	350
Vitamin C (mg%)	108	15.8	17.3	71.8

\*Longvah et al. 2017; # LakshmiPriya et al. 2016, \*\* Glover-Amengor et al. 2016

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Table-2: Phytochemical Composition and Health benefits of MO

Phytochemicals	Content *	Health benefits
Total Flavonoids#	257 mg/100 g quercetin equivalent	Cardioprotective, Anti-carcinogenic, hypolipidemic, hypotensive, & anti-diabetic properties, Anti-inflammatory effect
Total Phenols (Gallic acid, chlorogenic and caffeic acids)#	785.5 mg/100 g gallic acid equivalent	antioxidant, anti-inflammatory, antimutagenic and anticancer
Tannins	13.2 and 20.6 g tannin/kg of dried leaves	anti-cancer, anti-atherosclerotic, anti-inflammatory and anti-hepatotoxic properties
Saponins	64 and 81 g/kg of dry leaves	anti-cancer, anticholesterolemic effect
Phytosterols (stigmasterol, sitosterol and campesterol)	-	Galactagogue, Hypolipidaemic effect

\* Al-Taweel & Al-Anbari, (2019)

**Leaves:**

Moringa leaves have been used as a vegetable since ages especially in rainy season in some parts of India as a folkloric belief. These are good sources of both macro and micronutrients along with a wide variety of phytochemicals. The Moringa leaf protein (22.99-29.36% dry weight) contains all nine essential amino acids and thus is comparable to meat protein. The fat in Moringa leaves is rich in polyunsaturated fatty acids.

The nutrients and phytochemicals present in the leaves, pods and bark of Moringa plant together are responsible for their

health benefits as described below (Figure-1).

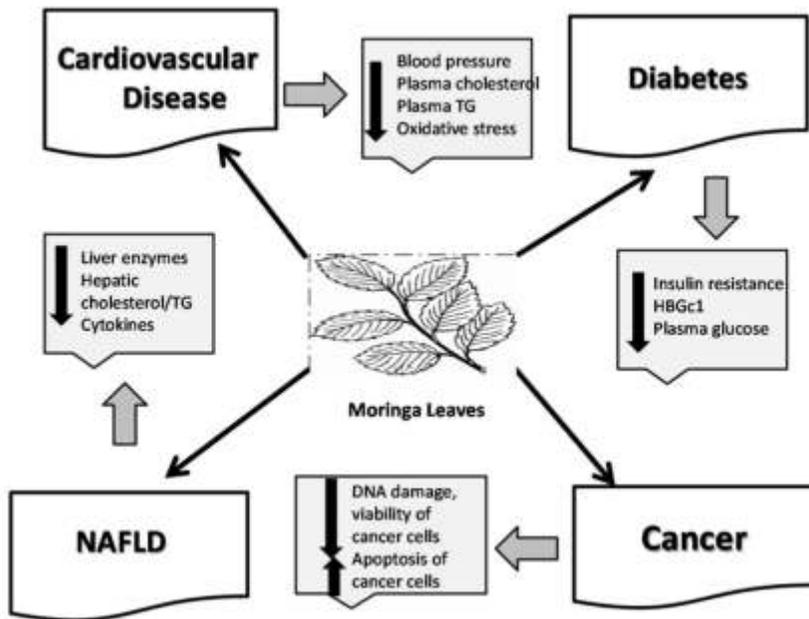
Figure-1: Therapeutic benefits of Moringa olifera (Patil et al, 2022)



Even after drying, Moringa leaf powder is an excellent source of vitamin C and minerals (calcium and iron) essential for bone health and blood formation. Moreover, moringa leaf powder is reported to be safe for human consumption (Stohs and Hartman, 2015). The functional properties of moringa powder i.e., foaming capacity and foaming stability make it an excellent value addition in several bakery foods such as breads, cakes and crackers along with ice creams.

The nutrients and phytochemicals in moringa leaves are responsible for their anticarcinogenic, antimicrobial, anti-cholesterolemic, antidiabetic, anti-inflammatory and antioxidant effects (Kashyap et al, 2022; Figure-2).

Figure-2: Beneficial effect of MO leaves in non-communicable diseases and mode of action (Vergara-Jimenez et al, 2017)



malnutrition, only processed products are recommended (Lakshmipriya et al, 2016).

Some processing techniques improve the nutritional and health benefits. For example, fermentation and germination improve the amino acid profile of Moringa seeds. Sautéing was found to improve the galactogogue effect of moringa incorporated noodles (Kiranawati, and Nurjanah, 2014).

**Conclusion**

Though moringa products are highly beneficial in various conditions, an overdose of moringa may cause accumulation of iron causing gastrointestinal distress and hemochromatosis. A daily dose of 70 g of moringa is suggested to be safe and prevents over accumulation of nutrients (Asiedu-Gyekye et al, 2014). In addition, persons on medications need to consider the superimposing effect of Moringa in conditions like blood pressure, diabetes etc.

**Pods**

The pods of moringa are rich in dietary fibre, lipids (oleic acid, linoleic acid, palmitic acid and linolenic acid), protein and minerals. Moringa pods are effective in treating diarrhoea, liver and spleen problems, and joint pains. These are highly preferred product of moringa as a vegetable especially in south India.



**Seeds**

Moringa seeds are rich sources of good quality protein, PUFA, vitamins, Minerals and Phytochemicals (tannins, saponin, phenolics, phytate, flavonoids, terpenoids and lectins). These constituents are responsible for its health benefits in Gout,

Rheumatism, Sexually Transmitted Diseases etc.

**Root Bark**

Moringa root bark is rich in alkaloids like morphine, moriginine, minerals like calcium, magnesium and sodium which are responsible for its cardiac stimulant, anti-ulcer and anti-inflammatory effects.

Several mechanisms have been proposed for the health benefits of MO as given in Table-3.

**Effect of processing/cooking**

Moringa leaves/seeds contain certain antinutritional factors -oxalates and phytates that could be reduced significantly by boiling. Hence whenever moringa products are used for treating



Table-3: Mode of action of health effects of Moringa oleifera\*

Health benefits	Mode of action
Hypolipidaemic effect	<ul style="list-style-type: none"> <li>• Inhibits cholesterol synthesis in the body and its absorption in the gut,</li> <li>• Increases degradation and excretion of cholesterol in the form of bile acids</li> </ul>
Antioxidant effect	<ul style="list-style-type: none"> <li>• Prevents generation of lipid peroxides</li> <li>• Inactivates Peroxyl radicals</li> </ul>
Anti-Inflammatory and Immunomodulatory Effect	<ul style="list-style-type: none"> <li>• Inhibits macrophages and Cytokine production</li> <li>• Inhibits the activity of neutral factor kappa-beta (NF-<math>\kappa</math>B)</li> <li>• Stimulates cellular and humoral immune responses</li> </ul>
Protective Effects on liver and kidneys	<ul style="list-style-type: none"> <li>• Inhibits drug induced cell damage in the liver and kidney</li> <li>• Prevents Non-Alcoholic Fatty Liver Disease (NAFLD)</li> <li>• Reduces serum SGPT, SGOT and Creatinine</li> </ul>
Anti-Hyperglycemic (Antidiabetic) Effect	<ul style="list-style-type: none"> <li>• Reduces insulin resistance and improve insulin sensitivity</li> <li>• Stimulates pancreatic B cells</li> <li>• Reduces starch digestion and glucose absorption in the gut</li> <li>• Reduces oxidative damage and inflammation in the pancreas</li> </ul>
Hypotensive Effects (niacinin A, niacinin B, niazimicin and niacinin A + B)	<ul style="list-style-type: none"> <li>• Facilitates Vasodilation</li> <li>• Reduces oxidative stress</li> </ul>
Anti-cancer effects (against Pancreatic, breast, liver and colorectal cancer)	<ul style="list-style-type: none"> <li>• Increases apoptosis (inhibit cancer cell division)</li> <li>• Reduces oxidative damage of DNA</li> </ul>
Benefits on vision	<ul style="list-style-type: none"> <li>• Inhibits cataract</li> <li>• Prevents night blindness</li> </ul>
Antiulcerogenic effect	<ul style="list-style-type: none"> <li>• Reduces acid &amp; pepsin secretion</li> </ul>
Antimicrobial effect	<ul style="list-style-type: none"> <li>• Acts against both Gram +Ve and Gram -Ve pathogens</li> </ul>
Anti-clastogenic effects Anti sterility effect	<ul style="list-style-type: none"> <li>• Prevents oxidative damage to chromosomes</li> <li>• Improves sperm production</li> <li>• Improves quality of sperm and eggs</li> <li>• Prevents sperm abnormalities</li> <li>• Prevents oxidative damage to sperms</li> </ul>

\* AbdullRazis et al, 2014; Zeng et al, 2019 ;

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# FRAMEWORK FOR UNDERSTANDING NUTRIENT TERMINOLOGY



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Anyone engaged in nutrient based dietary discussions is likely to be confronted with a whole lot of abbreviations/acronyms, such as, RDA, EAR, DV, RI, DRI, RNI, AI, PRI,

NRV, TUL and many more. Apart from this, the exact distinctions being made by attaching words; "recommendation," "reference," "requirement", "daily", "dietary", "allowances", "amounts," "values" and "intakes" to acronyms is elusive. RDA can either refer to 'daily' or 'dietary' allowance and DRV is a 'value' and DRI is an 'intake'.

Furthermore, these terms may comprise a single set of values for all individuals in a population or multiple sets of values for sub-groups within the same

population. Scarcely any attention is given to providing a framework of understanding. Within this confusing alphabetic soup, connections must be found: whether (a) the terms are harmonized (b) if so, are they derived following the same approach, and (c) are they deployed in similar settings; e.g., labelling, education, public health or policy. This article is limited to use of terms for regulatory purpose. Nutrition labelling is a standard developed by every country for its population. Misalignments in developing standards create complications in domestic and international trade.

Without a framework of understanding, a term - like RDA - may be inappropriately applied and must be avoided. Recommended dietary allowance (RDA) was designed to prevent nutrient deficiency diseases in a given population, and the original approach did not include consideration for other applications(1). Due to its limitations, and absence of agreements, it was open to improper use. For example, the ICMR RDA publication was not prepared for a regulatory purpose but was intended for public health use like nutrition surveys, clinical recommendations, data for government feeding programs etc.

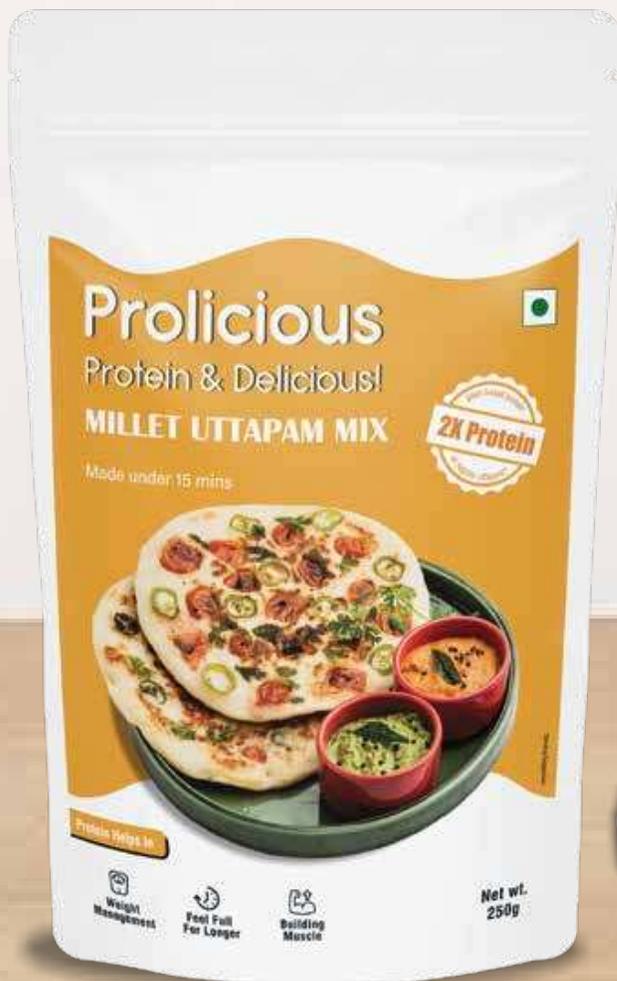




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amounts are derived as a percent of the Acceptable Macronutrient Distribution Range (AMDR), based on 2000kcal; e.g., 30% for fats, 10% saturated fat etc.



Regulation was never the intention, and therefore they do not have single cut offs (2). The FSS LD 2020 regulations instead of notifying a single set of values similar to Codex NRVs (CXG 2-1985) and other countries, it published ICMR's multiple set of recommendations for sub-groups prompting queries from businesses: "Which RDA value is to be declared on the product label".

Using the same term RDA for micronutrient and macronutrient declarations creates several anomalies. In the case of micronutrients, Codex (NRV), the US daily values (DV) and EU (RI), provide a single set of values for micronutrients for individuals in the population above a certain age: Codex is 36 months while US is 4 years (2). FSS LD 2020 provides multiple sets for sub-groups.

Secondly, Codex uses another term NRV-NCD relating to macronutrients fat, saturated fat, trans fat, sugar and salt (sodium), associated with reduced risk of chronic disease while providing adequate intakes of essential nutrients. These

The source of derivation for both labelling requirements- micronutrients and macronutrients - is different. RDA for micronutrients is derived from EAR. NVR-NCD, DV and RI used in nutrition labelling of macronutrients is based on 2000kcal. Using RDA in nutrition labelling is a misnomer.

Because such discrepancies arise in developing nutrient-based standards it is necessary that the method of deriving these terms is harmonized.

Recognising the absence of standardized terminology, several reviews have taken place to provide a framework for establishing standards (1). A joint consultative group concluded (1989) that the Recommended Dietary Allowances (RDA) should now be replaced in its entirety, by the term dietary reference

intake (DRI), rather than merely updating it.

The DRI comprises a set of at least four nutrient-based reference values, each of which has special uses or applications, as shown in the illustrated image.

These are Estimated Average Requirement (EAR), the Recommended Dietary Allowance (RDA), the Adequate Intake (AI), and the Tolerable Upper Intake Level (UL). The term DRI is considered sufficiently neutral and descriptive for the purpose of its broad uses.

Under this framework, there is alignment with EU's dietary reference values (DRV) which include population reference intakes (PRIs), the average requirements (ARs), adequate intakes (AIs) and the tolerable upper intake level (UL).

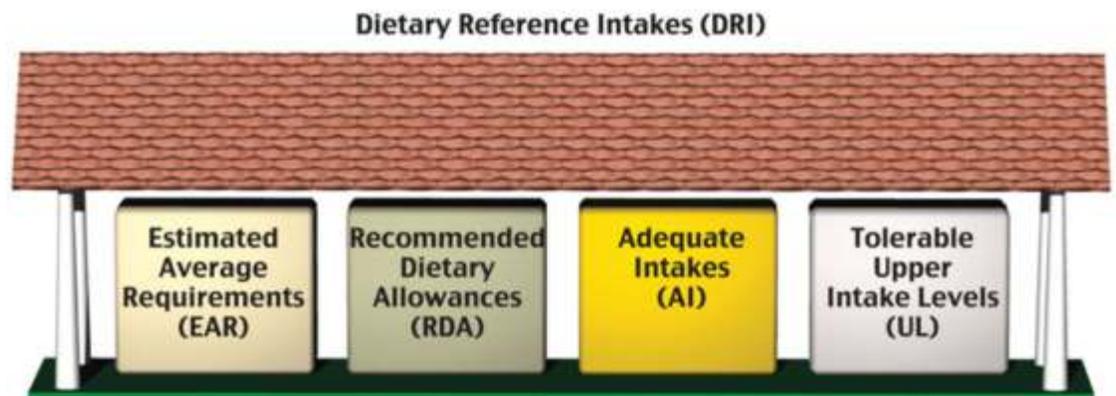


TABLE 1. Comparison of the suggested "harmonized" terminology with terms in use at present around the world

Recommendation	Harmonized terms	USA/Canada	UK	European Communities	Mexico	WHO/FAO
Umbrella term for the set of recommendations	NIV	DRI	DRV		VNR	
Average requirement	ANR	EAR	EAR	AR	RN	
Recommended intake level	INL <sub>x</sub>	RDA	RNI	PRI	IDR	RNI
Lower reference intake			LRNI	LTI		
Safe intake		AI	Lower end of safe intake range	Lower end of safe intake range	IDS	
Upper level of safe intake	UNL	UL	Upper end of safe intake range	Upper end of safe intake range	LSC	UL
Appropriate macronutrient distribution range			AMDR	Minimum and maximum population ranges		Population mean intake goals

AI, adequate intake; AMDR, adequate macronutrient distribution range; ANR, average nutrient requirement; AR, average requirement; DRI, dietary reference intake; DRV, dietary reference value; EAR, estimated average requirement; IDR, ingestión diaria recomendada; IDS, ingestión diaria sugerida; INL<sub>x</sub>, individual nutrient level, x = percentile chosen; LRNI, lower reference nutrient intake; LSC, límite superior de consumo; LTI, lowest threshold intake; NIV, nutrient intake value; PRI, population reference intake; RDA, recommended dietary allowance; RN, promedio de los requerimientos nutrimentales; RNI, reference nutrient intake; UL, upper tolerable nutrient intake level; UNL, upper nutrient level; VNR, valores nutrimentales de referencia

Broadly, agreements have centred around use of an 'umbrella' term which comprises a set of recommendations based on primary data. The EU use of the term Dietary Reference Values (DRV) and US/Canada, the term Dietary Reference Intake (DRI). It was further recommended that only two nutrient intake values (NIV), namely the average nutrient requirement (ANR), also designated as estimated average intake (EAR) and the upper nutrient level (UNL), also known as the upper level (UL) or tolerable upper level (TUL), were key terms required for developing a framework.

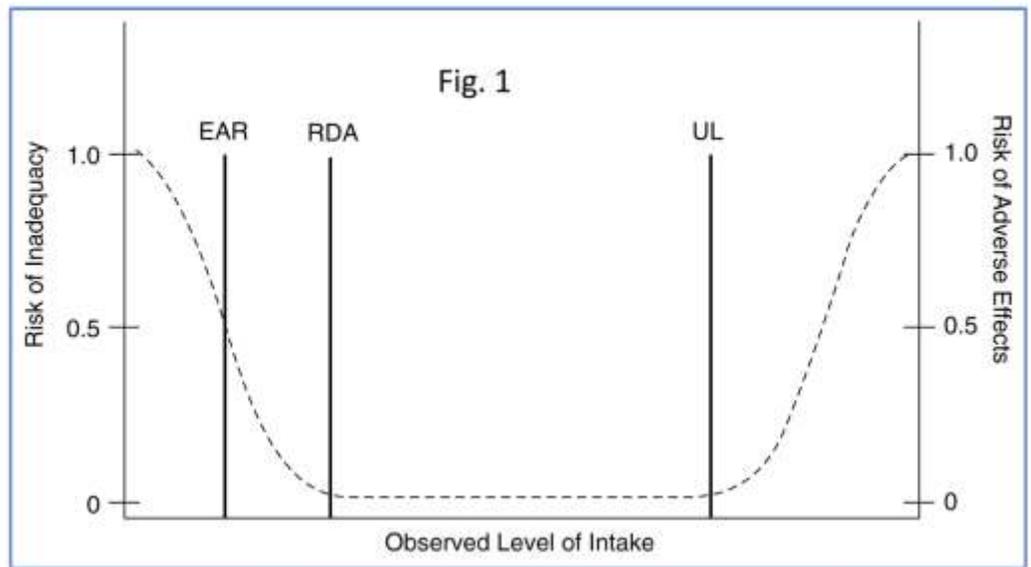
It recognizes that developments of other recommendations usually are derived from these two values (1). It did not consider the RDA as it is derived from the ANR or EAR as twice the standard deviation (SD). Equivalence between multiple abbreviated terms is established by the thread of derivation.

Briefly, the EAR is the nutrient intake value estimated to meet the requirement defined by a specified indicator of adequacy in 50 percent of the individuals in a life stage and gender group. At this level of intake, the remaining 50 percent of the specified group would not meet their nutrient needs. The EAR (US, India) is

used in setting the RDA (US, India), or PRI (EU) or RNI (UK, WHO/FAO). Their daily/dietary/intake is set at 2SD above the EAR sufficient to meet the nutrient requirements of nearly all (97-98%) individuals in a healthy population.

The Adequate Intake (AI) is set instead of an RDA (or similar terms PRI; RNI) where sufficient scientific evidence is not available to calculate an EAR. The AI is based on observed or experimentally determined estimates of average nutrient intake by a group (or groups) of healthy people.

The Tolerable Upper Intake Level (or similar terms UL; TUL) is the highest level of daily nutrient intake that is likely to pose no risks of adverse health effects to almost all individuals in the general population. As intake increases above the UL, the risk of adverse effects increases (Fig. 1) (1). These approaches of derivation provide the basis for harmonization of different terms used by countries and regions (1).



Food labels declare micronutrients and/or macronutrients as a percent of the daily dietary requirement. Two terms are used essentially to signal the method of derivation, namely EAR and 2000kcal. While countries may use separate terms for arriving at these daily reference amounts, for the purpose of labelling there is agreement to use a single term only so as not to confuse business and consumers.

Codex uses NRV-R for vitamins and minerals and NRV-NCD for macronutrients, saturated fat, sodium etc. EU labelling regulation (1169/2006), provides two lists: daily reference intakes (DRI) for vitamins and minerals and reference intakes (RI) for total fat, saturates, carbohydrates, sugars, protein and salt.

Similarly, the US has two lists: the Daily Reference Values (DRV) and the Reference Daily Intake (RDI). However, to avoid confusion in labelling a single term is used for both lists; Reference Intake (RI) and Daily Value (DV). India too needs one.

In summation, terminologies may differ between countries, and regions but connections can be found if the derivation route is similar. Nevertheless, some residual confusion will continue especially when the same acronym can have more than one connotation.

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# RED CHILLI ADDS ZING & COLOUR TO FOOD

Spices play a very important role in enhancing the flavour and taste of food products. A wide range of processed meals are prepared using spices because of their ability to add flavour and aroma. Red chilli also known as lal mirchi is a spice that is found in every Indian kitchen. It provides every meal to which it is added a delightful and spicy kick. Both fresh and dried chillies are used as spices in meals all over the world to add flavour by producing a hot, spicy and pungent taste. Its antimicrobial properties are also quite useful.

Red chilli is mostly used in its powder form in a wide variety of dishes. India is the largest producer, consumer and exporter of chillies in the world. In India, there are different types & varieties of chillies available such as Kashmiri chilli, Guntur chilli, Bhoot Jolokia chilli, Jwala chilli, Byadgi chilli, Boriya chilli, etc.

Kashmiri chilli also known as Kashmiri lal mirchi is generally

grown in Kashmir and parts of Himachal Pradesh. They are known for their deep red colour and are less spicy as compared to other Indian varieties of chilli. It is generally used in meals to add a dark red colour which is very appealing. Bhoot Jolokia is considered one of the spiciest and hottest Indian varieties of chilli. Capsaicin is an active component of chilli peppers which is responsible for the pungency and hotness of the chilli. In Bhoot Jolokia, capsaicin is present in high amounts. Byadgi chilli is famous in Karnataka. They are not very spicy and are used in a variety of dishes, it also provides bright red colour to the food. Used mostly in curries, sambhar, chutneys, etc (1).

Red chillies besides adding pungency and red colour to the

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dishes also contain a variety of nutrients like vitamins A, C, and K, etc. and minerals like potassium, copper, etc (2).

**What gives red chilli its colour and hot taste?**

Chilli peppers contain a variety of carotenoid pigments including capsanthin, beta-carotene, lutein, etc. One of the main pigments is capsanthin which is responsible for conferring the characteristic red colour to chilli pepper.





Before the chillies mature (ripen) i.e. when they are green in colour the pigments present are called chlorophylls. The transition from green to red is caused by chlorophyll breakdown and carotenoid production, giving chillies their red colour. Talking about its hot and pungent taste, capsaicin is the main component which gives peppers their burning taste. The real heat lies in the white tissue or pith inside the pepper which is called the placenta. Red and green chillies are the same. Red chilli is nothing but ripened green chilli which turned red and dried up with time. Some chillies are picked green while some are allowed to ripen on the plant until they turn red.

### Processing of Chillies: Red Chilli Powder (3,4)

For the production of red chilli powder, chillies undergo some processing like harvesting, cleaning, grading & sorting, drying, grinding, packaging & storage. After harvesting, they are cleaned, washed and graded based on colour, size, etc. There are various methods of drying chillies. The oldest and most common method is sun-drying, however even today it is most widely used all over the world as it is the

cheapest method for drying compared to other methods used. Nowadays, mechanical dryers are used to increase the speed of drying. Hot air drying is a popular method of drying chillies due to the relatively short drying time and even heating. Whole chillies take a longer time to dry as compared to slits or slices of chillies. Drying at a very high temperature causes a loss of quality in dried chillies such as a browning reaction, loss in nutrients, etc. The enzymatic browning can be prevented by pre-treatment methods like blanching and some chemical treatments that cause the inactivation of enzymes (5).



After drying, the dried chillies are ground into powder. To make red chilli powder whole dried chillies can be used. Reduction of size after grinding increases the available surface area of the fine ground product which eventually contributes to the better availability of constituents including tastes, fragrances, nutrients, and other volatile components. However, there are some drawbacks of grinding because

the heat generated during the grinding process of chillies causes loss of nutrients, flavour and colour of the product. Therefore, to overcome these problems, a cryogenic grinding technique is used. This involves grinding spices at extremely low temperatures. One of the major advantages of cryogenic grinding is the fine particle size, reduction in microbial load, etc.

Proper packaging of chilli powder is very crucial, as it determines the shelf life of the product. Chilli powder is hygroscopic in nature and if not packed properly will absorb moisture from the atmosphere resulting in sogginess or caking of the powder which will affect the quality. Chilli powder should be stored in a cool & dry place. The shelf life of chilli powder is 12 months as per the manufacturer.

### Red Chilli Pickle (6)

Red chilli pickle also known as lal mirch ka achar is a very popular traditional food in India. Pickles are a vital component of Indian cuisine and are consumed with many different food preparations in addition to the main course. They are employed as flavour enhancers. The red chilli pickle is made up of different red chillies like Kashmiri chilli, Boriya chilli, etc.





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It is made by stuffing various spices and condiments in it. First, the chillies are washed and then deseeded. Then they are stuffed with various spices like salt, turmeric, vinegar, mustard seeds, etc. Then these stuffed chillies are immersed in the oil well.

For the chillies to soften, this pickle must be stored in direct sunshine for at least three to four days. Even though you may have added enough oil when making the pickle, oil tends to settle at the bottom over time, to ensure that all the chillies are thoroughly covered in oil, mix the pickle thoroughly every week or so. Not only red but even green chillies are used to make pickles.

### Red Chilli Sauce

Red chilli sauce means the sauce prepared from red



chillies in combination with other ingredients. It is used to add flavours to a wide variety of dishes like noodles, fried rice, pasta, sandwiches,

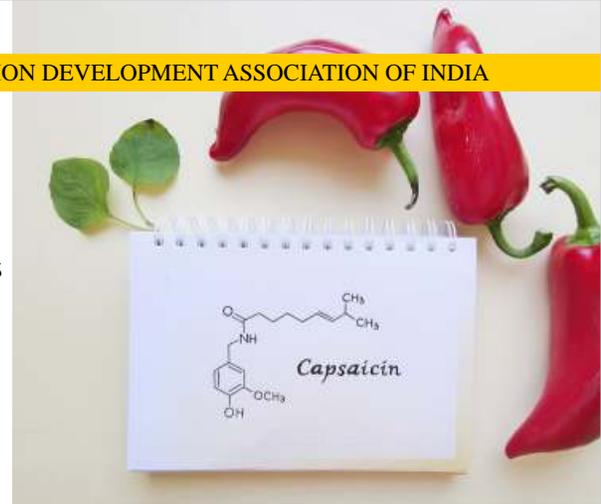
kebabs, spring rolls, etc.

The ingredients used to make red chilli sauce include red chillies, sugar, salt, spices, garlic, seasonings, vinegar, etc. The process involves various steps. After being harvested, the fresh red chillies undergo stem removal, washing, and grading.



The high-quality chillies are then blanched to both soften them and inactivate the enzymes. The chilli peppers are blanched before being crushed and put through a pulping machine to remove the seeds and create a puree.

The red chilli paste is then mixed with the



additional components, homogenised, and packaged.

### Health Benefits of Red Chilli (7):

In addition to giving the food a hot flavour and colour, red chilli has excellent health advantages. According to several researches, red chilli consumption is connected to a longer life expectancy, particularly when it comes to cardiovascular disease.

Capsaicin is an active component found in red chillies which has anti-inflammatory properties. Red chilli powder effectively aids in digestion, increases gastric juice production and alleviates symptoms like gas and constipation. Red chilli contains vitamin C which helps to strengthen the body's immune system.



## Culinary Uses of Red Chillies:

Red chillies are used in a variety of dishes and products whether as whole, slice, dried, in powder form or as chilli flakes. Red chilli powder is mostly used in curries, gravies, vegetables, soups, etc. to add spiciness as well as red colour to it. Dry chilli flakes are commonly used to top pizza, pasta, etc. Red chilli sauce is excellent for dipping chips, samosas, sandwiches, kebabs, and other snacks. The bigger versions of chilli peppers known as capsicum are used to make vegetables, are stuffed with spices to make bharwan mirchi, and are used in combination with other vegetables to make pav bhaji.

Red chillies are loved by people who enjoy spicy food. The target market for red chilli powder includes households, restaurants and food processing industries. Its abundance of nutrients and antioxidants can aid in the nutritional improvement of underprivileged people. Indian people are very fond of spices and spicy cuisines whether it is a veg or non-veg food. Whether it is sambhar, biryani, curries, fried foods, dal,



parathas, etc. are incomplete without chillies.

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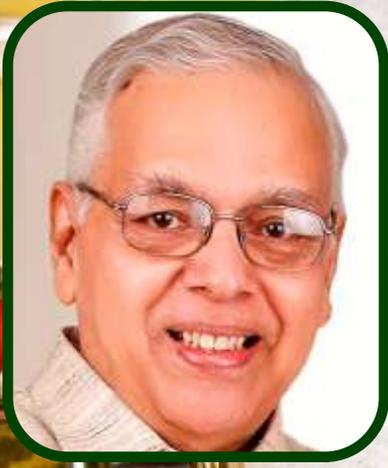
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# PASTA: THE DELICIOUS AND VERSATILE FOOD!

AUTHOR

Prof Jagadish Pai,  
Editor, PFNDAI



A global survey has named pasta as the world's most popular dish, ahead of meat, rice and pizza.

Not only is it popular in the Western world, pasta was named favourite in Philippines, Guatemala, Brazil and South Africa. As per another survey, Venezuela consumes most pasta after Italy, while Tunisia, Chile and Peru rank among top ten. Global sales in 2010 were US \$16billion (McClatchey, 2011). A recent estimate puts the global pasta market value at US \$25 billion in 2022 and likely to reach \$31 billion by 2028. (Research & Markets, 2023)

Pasta has become very popular among Indians lately. It is quite delicious and allows many advantages that it has become quite accepted by

cooks and food lovers. It has become truly a staple of cuisines globally. Although it is associated with Italy, most cultures and regions have their own version because of the versatile nature it offers so it can be made as easy or intricate and as traditional or modern as one wishes.

One of the reasons for its popularity is affordability and secondly one can make it healthy to by adding a variety of ingredients to make it nutritious and tasty as well. One can also make gluten-free versions also. It is one of the easiest dishes to cook. One needs to simply boil water, add pasta and heat, drain it, add favourite sauce and it is ready. One can add a variety of meat, vegetables, garnishes and flavourings to make it as tasty and nutritious as one wants. Only the imagination will limit the varieties possible.

Italy has given to the world a wide variety of different pasta dishes, but pasta has some roots in China where it is documented much before. It also has some mentions in culinary cultures of the Mediterranean. However, the

tasty pasta dishes were probably given by Italians by adding heavily tomatoes and sauces. (Secret Food Tours)

## Is pasta different from noodle?

Wheat flour or semolina made of commonly durum wheat, which is hard and yellow in colour, is the most common ingredient used for pasta. However, other varieties of wheat are also used in addition to other grains such as barley, buckwheat, rye, rice and maize, even chestnut and chickpeas. (De Vita et al. 2009)

Traditionally, noodles are prepared from common wheat, which is softer than durum whereas pasta is mainly made using durum semolina. This is coarse, hard and yellow in colour. It is also more expensive, so many manufacturers may use softer inexpensive wheat for pasta. Further, durum semolina is mixed with water to form dough, which is extruded, through mould or die to create a variety of shapes and sizes like spaghetti, lasagne or macaroni or shells.

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

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



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

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

**10% lower fat with excellent textural properties**

### Advantages of Finamul 4087L :

- Increased stack height
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- Controls cookie spread
- Improves surface texture
- Maintain texture over shelf life

### Major applications

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- Cookies
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such as rods, tubes, shells etc. Extrusion is done at a temperature below 50°C to prevent cooking or denaturing the proteins. There are pasta products prepared by extrusion cooking where

This process is difficult to do in home cooking so pasta is commonly sold dry on shelf and is prepared at home by boiling or baking after adding water.

Noodles on the other hand are prepared easily by preparing dough of flour and preparing sheet, which is run through machine to cut to desired size. Noodles are also sold fresh, dried, parboiled, steamed, deep fried etc. (Goodman 2016)

Pasta especially made using durum wheat semolina is very common in Italy and other European countries. However, some of the places use other wheat varieties and flours to prepare pasta products. Noodles have been more common in Asian countries and are prepared using wheat flour. Durum wheat gives bite to the products, as it is hard wheat. Softer wheat producing noodles, look for elasticity, firmness or softness.

### Pasta Processing

Traditionally, dough of semolina and water is prepared by mixing them at 30% moisture. Eggs may also be added which improves binding as well as texture of product. After kneading, the dough is extruded to prepare sheets, strips or using special dies to make various shapes

product is precooked in the process using slightly higher temperature. These products do not require much cooking by consumers to prepare final product.

Kneading is an important operation as it helps make springy, elastic texture in the product with good eating quality. The extruded material is then dried to around 12.5% moisture. (Rosentrater & Evers, 2008)

### Other Ingredients

In some places, only durum semolina is used for making pasta, but in others, they use soft wheat flour, maize flour or various other diluents. In many African pasta is made from non-wheat materials like corn and sorghum. As gluten-free pasta started gaining popularity, combination of corn and rice as well as other gluten-free cereals such as quinoa, amaranth and teff have been used.

Gluten is formed when wheat flour or semolina is mixed with water and this helps in dough development during mixing and extrusion. Gluten does not allow breaking into pieces of pasta during cooking with hot water. Lack of gluten is compensated by using starch or corn flour and allowing gelatinisation of starch during mixing and extruding. Other

ingredients such as eggs, egg albumin, guar gum and xanthan gum have also been used to improve quality and binding.

### Noodles

Noodles are quite common in many Asian countries. They are prepared using



wheat, rice and other materials like buckwheat and starch from potato, sweet potato and pulses. One can prepare wheat noodles with flour, water and salt. Dough will be prepared by mixing. Sheets are prepared by rolling and then sheets are cut and dried. The noodles for eating may be prepared by boiling, steaming, frying etc. (Arendt & Zannini, 2013)

### Texture is Important

Food texture is as important as taste and flavour and pasta is no exception. You can get spaghetti at different prices even though they have same ingredients namely semolina and water. When pasta is extruded it takes time but there are plastic dies which expedite the process so one can produce large quantity in shorter time with smooth surface. This however, creates problem as an imperfectly cooked noodle will wilt in sauce. Brass dies will create rough skin on pasta that grips the sauce better. It also will be easier to cook to perfection even though takes longer time. (Celenza, 2020)

**Different**

**Foods/Products**(Erudus October 2021)

Some of the popular pasta dishes include spaghetti bolognese, which is spaghetti and sauce made of beef, tomatoes, onions, bacon, red wine and herbs and served with parmesan cheese.

Lasagne comes in flat, wide sheets with layers of pasta with various fillings. Layers include ragu and béchamel sauce with parmesan cheese and may include vegetables, mushrooms.

Ravioli is a type of filled pasta. Fillings vary but include ricotta cheese and spinach, seasoned with nutmeg, black pepper, spices & lemon rind.

Macaroni cheese is commonly associated with American cuisine. It consists of macaroni (short tubular) pasta, baked in cheese béchamel sauce in oven.



**Is Pasta Healthy**

(Ajmera 2023) Basic material for pasta is wheat and water. Nobody

eats pasta just like that but there will be all kinds of additions like meat, fish, poultry, eggs, vegetables, cheeses, tomato & other sauces, herbs and many more. There are many different basic materials being used now. Whole or refined grains & cereals are

used. These are all depending on the likes and availability. So people can choose how healthy their pasta should be.

Pasta can have high carb. Depending on how often and how much one eats at one go, it can cause obesity, cholesterol and other problems. However, when one adds whole grains and many vegetables, less red meat, and certain other changes, it can be a healthier option.

**Finally**

People love this particular food type and its consumption is increasing everywhere. Although it can cause some health issues, one can make certain changes in the ingredients and make it healthy. It can be a very tasty and healthy food.

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# IRON PROVIDES PHYSICAL & MENTAL STRENGTH

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## Deficiency of Iron globally & in India

Anemia affects mainly children, pregnant and lactating women as well as adolescent girls and premenopausal women. It is estimated by WHO that globally 40% of all children from 6 months to 5 years as well as about 37% pregnant women and 30% of premenopausal women are anemic. This disease is caused by many factors, nutrient deficiency being a major factor. Iron deficiency is the most common among the nutritional deficiencies (1).

Prevalence of anemia in India according to National Family Health Survey 5 (2019-21) is among men, 25%, women, 57%,

adolescent boys, 31.1%, adolescent girls, 59.1%, pregnant women, 52.2% and children of 6 mo to 5 yrs (67.1%) (2). This shows that we have a problem that needs to be tackled effectively soon.

## Functions of iron in body (3)

Iron helps keep blood healthy. Iron is an important component of haemoglobin, which carries oxygen from lungs to various parts of the body where it is required by the cells to derive energy and for other functions. When iron is deficient, not enough haemoglobin is made causing anemia. Because cells are not getting enough oxygen fatigue sets in and one feels tired. People of all ages get anemia with iron deficiency being most common. It affects growing children, women who are pregnant or menstruating the most as they need more iron for growth or to replace loss of blood. (4) Sometimes fatigue is not due to anemia but due to low ferritin level especially common in women. Improving iron stores in body will take care of this (5).

Athletic performance is very much affected by iron status of athletes. There are cardiac and skeletal muscles that contain protein myoglobin, which contains iron and can bind oxygen. The main function of myoglobin is to supply oxygen to muscle cells as these muscles need continuous supply of oxygen to perform well by converting stored energy and providing it to these muscles. These muscles must perform well in order for athletes to perform in various sports (6).

It has been shown that iron deficiency affects cognition. When iron in blood is low, concentration and attentiveness are affected and getting iron to normal level improves concentration and cognitive performance (7).

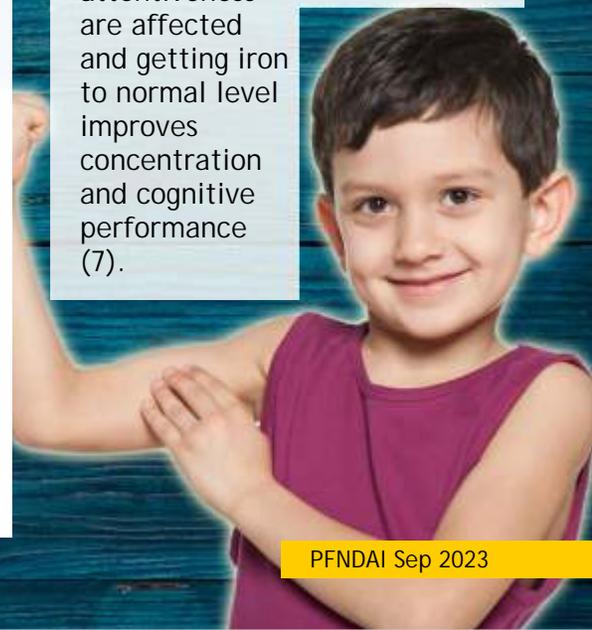


Table: RDA of Iron for Indians (9)

Age Group	Category of work	Body Wt	Iron
		(kg)	(mg/ d)
Men	Sedentary	65	19
	Moderate		
	Heavy		
Women	Sedentary	55	29
	Moderate		
	Heavy		
	Pregnant woman	55 + 10	27
	Lactation 0-6m		23
7-12m			
Infants	0-6 m*	5.8	-
	6-12m	8.5	3
Children	1-3y	12.9	8
	4-6y	18.3	11
	7-9 y	25.3	15
Boys	10-12y	34.9	16
Girls	10-12y	36.4	28
Boys	13-15y	50.5	22
Girls	13-15y	49.6	30
Boys	16-18y	64.4	26
Girls	16-18y	55.7	32

Some of the additional symptoms of iron deficiency besides fatigue and decreased athletic and cognitive performance are: shortness of breath, dizziness, headaches, pale skin, weak & brittle nails, poor memory and difficulty in concentration. Low haemoglobin level indicates anemia and low serum ferritin suggests iron deficiency (3).

**Recommended Dietary Allowance (8)**

Anemia is a serious problem in India and it is seen in 50-70% of the population. It affects mostly infants and young children, adolescent boys and girls, women of childbearing age and pregnant women. The major cause is the deficiency of iron in diet.

The children are growing rapidly and need a lot of energy not just for activity but to build additional weight as they are growing so they need a lot of iron to support that. As they become older their requirement reduces as their growth slows down until they become adults. The adults are recommended much more than West, since Indian diet is mostly cereal based so the absorption is much less compared to meat based diets.

Girls will have similar requirements as boys in younger age but once changes set in adolescence their requirement suddenly jumps especially because loss of iron through menstruation. When women become pregnant they need to support the growth of fetus and that needs more iron. Even after the birth of child, lactating women need more iron. Following table gives the RDA of

Indians at different stages.

**Iron Contents in Foods (10)**

Some grains contain good amounts of iron but it is all non-heme iron, so there is problem of low absorption. Amaranth contains about 8 to 9 mg/100g, while bajra 6.5 mg, jowar 4 mg, ragi 4.5 mg, and whole wheat flour 4 mg. Among legumes Bengal gram has 7 mg, black gram 6 mg, green gram 5 mg, rajmah 6 mg, horse gram 9 mg, soybean 8 mg, - lentils 7.5 mg and cowpea contains 6 mg.

Green leafy vegetables are also rich sources of non-heme iron: amaranth leaves, red 7 mg, fenugreek leaves 6 mg, and spinach 3 mg/100g. Among vegetables cluster beans have 4 mg while among fruits dates are rich in iron with about 3 to 4 mg. Raisins also have 4 to 6 mg. Among fresh herbs coriander leaves (5.5 mg), mint leaves (8.5 mg) and curry leaves (8.5 mg) are rich in iron. Nuts have good amounts of iron: almond 4.5 mg, cashew 6 mg, and walnut 3 mg.





Among animal foods whole eggs have 1.8 mg, chicken meat about 1 to 1.5 mg, chicken liver 10 mg, goat meat about 1.5 to 2 mg, goat liver 6.5 mg, beef meat 2 mg and liver 15 mg. ham 1 mg, pork liver 21mg and among fish mackerel has 1.5 mg, mullet 1.3 mg, black pomfret 1 mg, tilapia 3 mg, tuna 1.6 mg while shellfish have about 0.5 to 1 mg/100g.

**Heme & Non-Heme Iron (11)**  
 Iron is present in food sources in two forms namely heme and non-heme. Heme form is present in animal sources including meat, fish and poultry while non-heme form is present in plant sources such as fruits, vegetables, pulses, nuts, cereals and also in meat. Non-heme iron is usually mostly consumed from foods. About 90% total iron consumed is non-heme in the form of mostly Fe+3 and its absorption is affected by dietary factors and iron status of the body. Heme iron on the other hand has high rate of absorption and less affected by dietary factors.

**Factors affecting iron absorption (11)**  
 Iron in breast milk is low, about 0.4 mg/L and infants are

fed exclusively on breast milk. Infants have enough iron stored during fetal stage when mothers are not deficient during infancy. Even this low iron content is absorbed by

infants at very high rate of about 49%, while the cow milk iron absorption was just about 10% under similar conditions. (12)

Although heme iron accounts for just 10% of intake, it is absorbed at 15 to 35% so body may receive over 40% from heme iron after absorption. However, those who do not consume much meat or are vegetarian, they have to depend on non-heme iron from plant sources, which is absorbed at less than 10%. There are many factors affecting non-heme iron from diet.



NORMAL RBC COUNT



ANEMIA



Ascorbic acid present along with non-heme iron increases absorption. Ascorbic acid can even counteract the inhibitory effects of phytate, oxalate, silicate as well as polyphenols. Animal tissues like chicken, fish, lamb etc have a positive effect on dietary non-heme iron absorption.

Phytate and

polyphenols can lower iron absorption by forming complex with iron in GI tract. Phytase can degrade phytate and improve iron absorption. Polyphenols present in vegetables, cereals, spices, tea, coffee etc. work similarly to reduce absorption. Calcium can also inhibit absorption of iron and is different from other inhibitors in that it inhibits both forms of iron. Milk can adversely affect iron absorption because of calcium and casein as both can lower absorption of iron from diet.

Encapsulation protects the iron from inhibition. Chelation with some peptides has been shown to reduce inhibition. Na-iron-EDTA form of iron was found not inhibited.

**Fortification & Supplements**  
 When food fortification of food products or development of supplement with iron is being planned, we must keep the above points in mind as some of the combinations will cause lower absorption or bioavailability of iron. Using some ingredients and nutrients such as ascorbic acid it is possible to improve the absorption. Milk is high in calcium and casein, which inhibit iron absorption so may not be a suitable vehicle for iron fortification.



## Looking Ahead

There is a need for improving iron status of Indians as it has been shown that a large proportion of population is deficient in iron and many are anemic. Adolescent and women are particularly vulnerable because of their large needs for iron. Deficiency among pregnant women can affect the infant's iron store when born and will affect both physical and mental development. We need to understand the complex nature of iron absorption in presence of various nutrients and components of foods that affect the absorption. It is possible to prepare food products that have low effect on absorption. This is particularly important with plant-based diet where the absorption can be significantly affected by some inhibitors. There is need for research and development work as we may be changing our diets to include larger proportions of millets, which have larger amounts of minerals including iron, but also some critical inhibitors.

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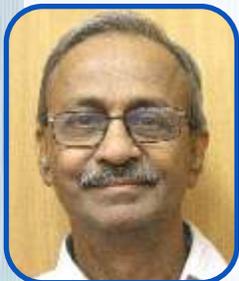


# NUTRITION AWARENESS ACTIVITY WEBINAR ON 'BUSTING DAIRY MYTHS: DAIRY CAN BE PART OF HEALTHY DIET!'



AUTHOR  
Ms Anuja Padte,  
Food Scientist, PFNDAI

PFNDAI organized a Nutrition Awareness Activity in Collaboration with SMC College of Dairy Science, Anand, Gujarat. The theme of the Activity was Health & Nutrition Through Milk & Dairy Product. The Sponsors of the event were Mother Dairy, Zydus Wellness & Nestle India.



The webinar began with a welcome address from Dr Shashank Bhalkar, Assistant Director,

PFNDAI. He warmly greeted all the speakers and delegates and provided an overview of the contest. Dr Bhalkar spoke about the 8000-year-old

history of dairy in India, starting with the domestication of Zebu cattle. Anand Milk Union Limited was established in 1946 to address the exploitation of small dairy farmers in Gujarat's Kaira District. The cooperative model began with a few villages and has become a massive success, now known as the AMUL model. Dr Verghese Kurien, the Father of India's white revolution, became AMUL's first General Manager in 1949. India's dairy production success can be attributed to replicating the AMUL model throughout the country. He also informed that Dr Kurien was Chairman of PFNDAI in 1970.

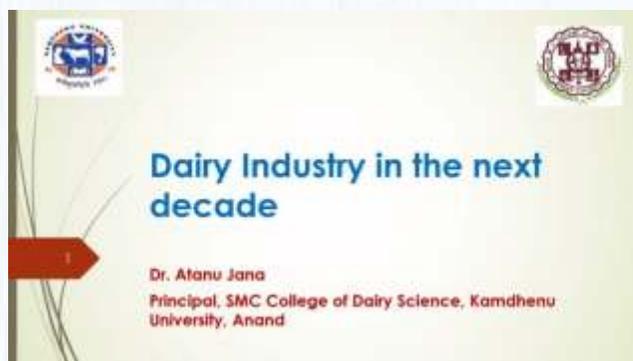
Dr Jagadish Pai, the Executive Director, in the Inaugural

session spoke about the advantages of milk proteins and assured us that we would receive a comprehensive list of benefits of Milk & milk Products.

Ms. Dolly Soni, Manager of Marketing & Projects, Seminar Convenor, PFNDAI then introduced all the speakers for the day.



Dr Atanu Jana, Principal-SMC College of Dairy Science, Kamdhenu University, Anand, Gujarat talked on Dairy Industry in Next Decade.



Dr Atanu Jana



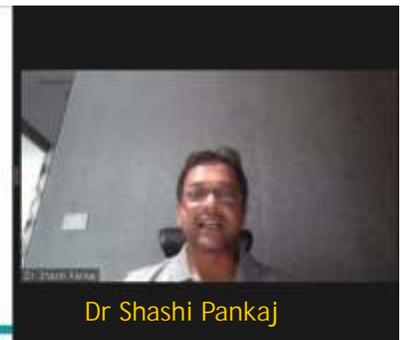
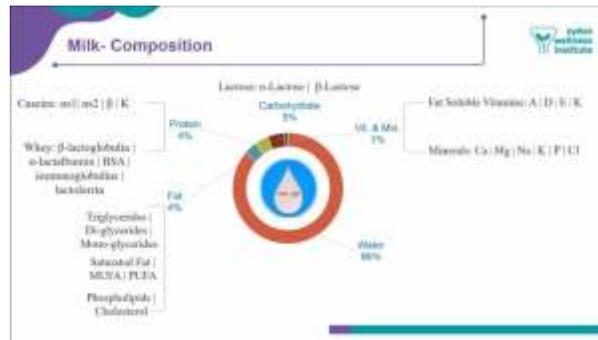
Ms Shilpa Wadhwa

immunity, and provide high-quality protein. He also discussed the digestive benefits of dairy and the fortification journey at Mother Dairy, including the addition of vitamins A and D to products such as Poly Pouch Milk and Dhara Oil.

Finally, **Dr Shashi Pankaj, Senior Manager - F&D, Zydus Wellness R&D** and **Ms. Shilpa Dhar, Scientist- Scientific Affairs and Research, Zydus Wellness R&D** spoke on

He gave an overview Indian Dairy Industry where he mentioned The Indian Dairy Industry produces 23% of global milk with a steady 6.2% CAGR. Biotechnology is used to enhance milk production in cows through the use of hormones and embryo transfer. Technology is used in dairy processing including High-Pressure Processing/Micro articulation, Induction heating, and Extrusion processing. Additionally, lactose-free dairy, milk enriched with CLA, and melatonin are available.

obesity by 13% and 16%, respectively, and is associated with a lower BMI and higher lean mass. Diets that include dairy lead to greater reductions in weight, fat mass, and waist circumference.



Dr Shashi Pankaj

**Ms. Shilpa Wadhwa, Head-Nutrition, Health & Wellness,** Nestlé India spoke on Dairy Products & their benefits in Human Health. She mentioned that Milk is a nutrient-rich food with 18 essential nutrients, including fatty acids and calcium. It helps promote child growth, improves bone health, and reduces the risk of metabolic syndrome and obesity. Increasing milk intake by 200 g/day lowers the risk of metabolic syndrome and

**Mr. Prashant Bhat, Chief R&D Officer- Mother Dairy Fruits and Vegetables Pvt Ltd** talked on How milk & VADP (Value Added Products) can improve Nutrition & Sensory of Food. Mr. Bhat discussed the value creation in dairy and opportunities in the value-added products segment. He emphasized that 54.4% of the dairy business is in value-added products. He talked about how dairy products help with everyday nourishment, digestive health,

Importance of Milk Proteins for a Healthy Lifestyle.

Dr Shashi explained that milk has various proteins, with four caseins and two whey proteins being the most abundant. These four caseins, namely  $\alpha_1$ ,  $\alpha_2$ ,  $\beta$ , and  $\kappa$ -caseins, make up 80% of the total protein in milk. They form casein micelles, complex protein structures, and are also known as phosphoproteins. Bioactive peptides are protein fragments that have functional and physiological benefits, produced during digestion, fermentation, and hydrolysis of food products. Dr Shashi gave an overview of dairy products and their categories.



**How Milk & VADP can improve Nutrition & Sensory of Food**

Prashant Bhat  
Chief R&D Officer  
Mother Dairy Fruit & Vegetable Private Limited



Mr Prashant Bhat





Ms Shilpa spoke on Milk and Its Health benefits where she discussed the health benefits of milk, including its significance as a source of protein, and the ICMR/NIN "thali" concept and the US "Choose My Plate" program. She explained the medical advantages of whey protein, such as boosting the immune system, maintaining tissues, and preventing muscle breakdown during exercise. Casein, another protein in milk, has benefits, including

reducing total cholesterol levels, antibacterial effects, and protection against colon cancer. Different milk types like camel, goat, and donkey milk offer unique benefits due to their varying protein compositions. Milk proteins like casein and whey are important for human nutrition and health.

After each presentation, there was a question-and-answer session where the speakers eagerly responded to all the

inquiries posed by the attendees. The webinar was enthusiastically attended by approximately 180 participants from Industry and Academics. Ms. Dolly Soni gave vote of thanks.

Webinar Presentations recording is available in the following link:  
<https://fb.watch/mz0JhBqfkd/>



Interactive Session by Dr B Sesikeran & Winner Announcement Dairy Product Development Contest As the second part of Nutrition Awareness activity, an Interactive Session by Dr B Sesikeran and the Winners announcement of the Nutrition Awareness Activity Dairy Development contest was organised on 11th August.

Dr B Sesikeran, Chairman of the Scientific Advisory Committee Honorary Scientific Director of PFNDAI, and former Director of NIN (ICMR), expressed his pleasure at learning about an event that focuses on the health benefits of milk and other dairy products. Milk has been a staple food in India for over



8000 years and has played a significant role in Indian civilization. Sesikeran thanked the dairy scientists who have made it possible for India to be one of the top milk producers in the world. Milk is a wholesome food that provides satiety, making it an ideal breakfast option for children. The protein in milk is of the best quality, and it is considered a 100% protein-digestible amino acid score. Milk is an important source of calcium, which is crucial during childhood, adolescence, and early reproductive life in women. Milk and dairy products have both positive and negative aspects, and it's essential to understand their value for our bodies.

After the talk, Dr Sesikeran, Dr Shashank Bhalkar, Dr Kanade, Mr Purnachand & Dr Ehsan Shaikh answered some questions from audience.

**Question:** The percentage of degradation of proteins each time milk is being boiled?

**Answer:** Milk boiled to its boiling point of about 100 degrees Celsius doesn't denature the protein in the milk. However, exposure to higher temperatures may cause a small percentage of protein to denature, resulting in changes in flavour, but not in amino acid content. Therefore, there is no need to worry about changes in protein quality unless the milk is almost burnt. In terms of nutritional quality, milk protein does not change significantly.

Dr Bhalkar asked whether it will also affect the digestibility? The answer for this was, Protein digestibility improves when it breaks down into smaller fragments. Protein hydrolysates are less allergenic





than whole proteins. Even denatured proteins are easier to digest, resulting in improved enzyme activity. Milk protein is highly digestible, making it easy to tolerate.

Further Dr Kanade Dr Sesikeran about A1 and A2 milk. A1 milk is less digestible and more allergenic than A2 milk due to the genetic variation between the cows that produce them. Most milk in India, including buffalo milk, is A2, which is typically the safer option.

Mr Purnachand mentioned that during an earlier webinar at SMC College, he learned from a speaker that the supposed advantage of A2 over A1 is not fully established. Additionally, there are differences in certain amino acid sequences that are still being studied, but it is not conclusively established that one is better than the other.

Dr Ehsan Shaikh, a professor, agreed with Mr. Purnachand's opinion on A1 & A2 milk. He explained that BCM-7's issue may be due to a single amino acid change from histidine to proline, making it difficult to digest. Absorption of peptides longer than three amino acids is challenging, and information on absorption is limited. It's important to have scientific evidence before making any

claims about A2 being superior to A1.

In a discussion on Milk and Dairy Products, Dr Kanade questioned the validity of the correlation between A1 milk and certain diseases. Dr Sesikeran clarified that while it hasn't caused problems in India, it may be harmful to children according to Western literature. Buffalo milk may be a better option than cow's milk, but it's not commonly used in the Western world. Dr Kanade explained that buffalo milk is prevalent in North India, while cow's milk is more prevalent in the south. Milk export is not significant due to high demand within India. In the Q&A session, students received guidance from industry experts. The judges praised the participants for their creative contributions and emphasized understanding ingredients and consumer acceptability.

Dr Ehsan Shaikh, Professor SMC College then announced the winners for the Dairy Development contest. Students from Anand Agricultural University, Parul institute of technology, A D PATEL Institute of Technology, MIDFT, Mehsana, College of Food Processing Technology and Bioenergy, G.N. Patel College of Dairy Science and SMC College of Dairy Science, Anand had participated.

The Winners for the Dairy Development contest were as follows.

1stPrize: Ms. Vamika Sena and Ms. Himani Prajapati, College of Food Processing Technology and Bioenergy, Anand for their product Probiotic Camel Milk Yogurt enriched with Pearl millet

2ndPrize: Ms. Vandana Pavra & Ms. Dishaben Zala College of Food Processing Technology and Bioenergy, Anand for their product Iron-fibre rich Paneer with goodness of Little Millet

3rd Prize: Mr. Om Parmar & Ms. Saloni Chauhan, SMC College of Dairy Science for their product Lactose free Probiotic Milk Shake

There were 3 consolation Prize which were achieved by the following students.

Ms. Saiyed Rizabanu Sirajuddin & Ms. Pancholi Srushti Prakashchandra, SMC College of Dairy Science, Anand for their product Ragi Chhachh

Mr. Vyas Meet Kamleshkumar & Ms. Kapatel Sakshi Maheshbhai, G. N. Patel College of Dairy Science for their product Shatavari - Aloe Vera Based Fermented Milk

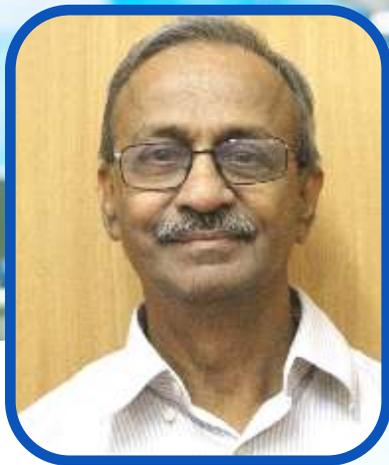
Mr. Kaushal VimalbhaiArdehana & Mr. Chauhan Akshit Manishkumar SMC College of Dairy Science, Anand for their product Vitality Elixir, Immune Boosting Super Food Shake.

All the winners were congratulated, and the session was ended by a Vote of Thanks by Ms Dolly Soni. The recording of session can be seen on following site:

<https://fb.watch/mCDvAAb1Ss/>



# REGULATORY ROUND UP



**AUTHOR**  
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Dear Readers,

Following are notifications /orders after last Round Up.

Following are the notifications /orders after last Round Up.

[Standard Operating Procedure \(SOP\) for obtaining the endorsement of Vegan logo:](#)

The order explains SOP for obtaining the endorsement of Vegan logo as per FSS (Vegan) Regulations 2022. FSSAI vide order dated 24th February 2023 has published revised guidelines for submission of applications of



endorsement of Vegan logo for approval. After the due approval of application FBO shall apply for endorsement of Vegan logo on line at theFoSCoS portal. All the required formats and

guidelines are given in the same order. The order is useful to many new FBOs and start-ups who intend to manufacture Vegan products.

[FSS \(Alcoholic Beverages\) Regulations, 2023 related to Single malt whisky and Single grain whisky and declaration of nutritional information:](#) This is the final notification which differentiates between the

Single Malt whisky and Single grain whisky. Now the label may have declaration of energy.

Earlier rule 2.8.1 described Single Malt Grain Whisky together, in which it was



defined as distilling fermented mash of "Malted Grain or Barley." This first amendment differentiates between Single Malt

whisky and Single Grain whisky. As per the amendment which added 2.8.1 i) as single malt whisky exclusively made from malted Barley and 2.8.1 ii) as single grain whisky obtained by fermented mash of malted or un malted grain.



As per rule 5.5, earlier no Nutritional information was necessary on the label. As per the amendment, only change is that the label can have energy declaration in Kcal, which is voluntary. This amendment shall come into force from 1st March 2024.

[Order regarding the list of Laboratories approved by FSSAI to be declared as NRLs](#) :

This order gives list of eleven National Reference Laboratories (NRLs) for specified areas. For example, EIA Cochin is declared as NRL for Genetically Modified Foods. Additionally, EIA Chennai will be Ancillary National Reference Laboratory (ANRL)



for microbiology. The order also specifies functions for these laboratories. Readers may refer the order for these functions. The recognition of NRL shall come in effect only after receipt of MOU duly signed by NRL and accepted by FSSAI.

[Directions to all FSSAI Notified laboratories for Organic testing](#) : Government of India

wants to promote Organic Foods by encouraging and strengthening cooperative societies. The success depends upon the available testing facilities. This order gives directions to all FSSAI notified laboratories to upgrade their facilities so that they are capable for Organic foods testing also with all the approvals required for such testing.

[Validity Order of FSSAI notified Food Testing Laboratories](#) : This order gives FSSAI recognised laboratories along



with validity of their NABL accreditation and scope of testing as on 28th August 2023. The list is routinely published by authorities and will be useful for FBOs to get their samples tested.

[The Legal Metrology \(Packaged Commodities\) \(Amendment\) Rules, 2023](#) :

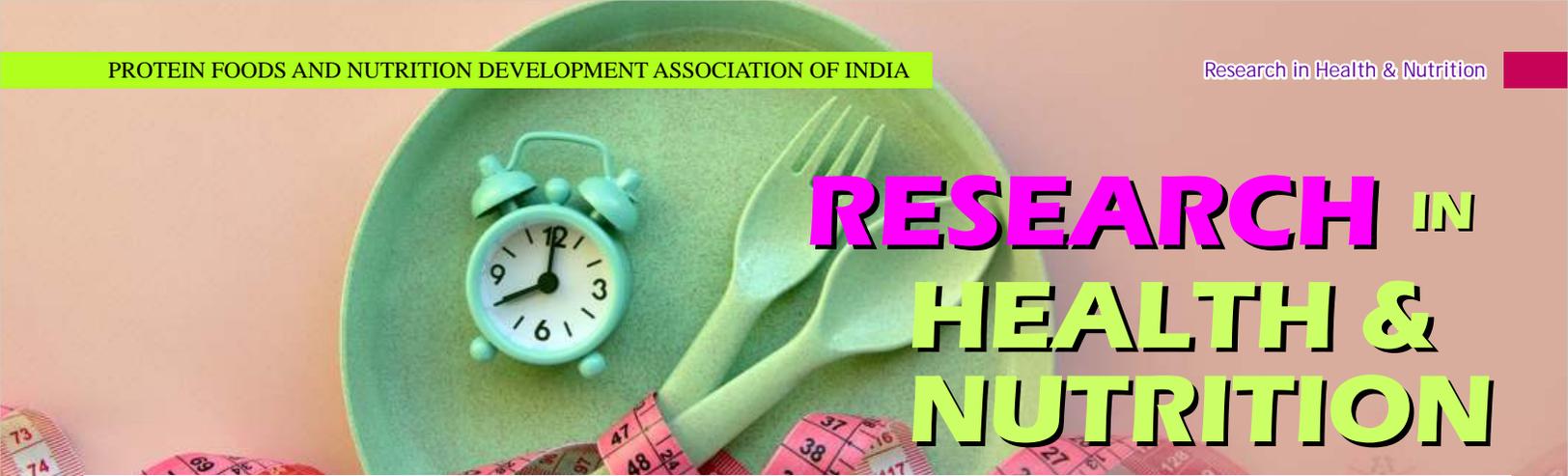
This amendment postpones the date of declaration of Unit Selling Price on the package to 1st October 2023.



[The Jan Vishwas \(Amendment of Provisions\) Bill, 2023](#)

Indian Parliament recently passed this bill to increase the ease of doing business. The bill has decriminalised many offences and replaces imprisonment with fines. Of interests to Food Industry are Legal Metrology Act (2011) and Food safety and standards act (2006)





# RESEARCH IN HEALTH & NUTRITION

## Fasting can help you lose weight, but you might gain it back quickly

Science Daily June 29, 2023

Water fasts -- where people consume nothing but water for several days -- might help you lose weight, but it's unclear how long you'll keep it off, according to research from the University of Illinois Chicago. And the other metabolic benefits of water fasts, such as lower blood pressure and improved cholesterol, seem to disappear soon after the fast ends, the researchers found.

However, there do not appear to be any serious adverse effects for those who do water fast or a similar kind of fast where people consume a very small number of calories a day, said Krista Varady, professor of kinesiology and nutrition, who led the research, which is published in Nutrition Reviews. "My overall conclusion is that I guess you could try it, but it just seems like a lot of work, and all those metabolic benefits disappear," Varady said. She stressed, however, that no one should undertake one of these fasts for more than five days without medical supervision.

The new paper is a literature review of eight studies on water fasting or Buchinger fasting, a medically supervised fast that is popular in Europe where people consume only a tiny amount of juice and soup a day. Varady's team looked at the results from each of those papers to see what story they cumulatively tell about the fasts' impact on weight loss, as well as a number of other metabolic factors.

Fasting did seem to spur noticeable short-term weight loss, the researchers found. People who fasted for five days lost about 4% to 6% of their weight; those who fasted for seven to 10 days lost about 2% to 10%, and those who fasted for 15 to 20 days lost 7% to 10%.

Only a few of the studies in the review tracked whether participants gained back the weight they had lost once the fast ended. In one of those, people gained back all they had lost in a five-day water fast within three months. In two other studies, only a small amount of the lost weight returned, but those studies encouraged participants to restrict their calorie intake after the fasts ended. In contrast, it was clear that the metabolic benefits of the fasts

disappeared soon after the fasts ended. Improvements to blood pressure, cholesterol and blood sugar levels were short-lived, returning to baseline levels quickly after participants started eating again.

Some of the studies included participants with Type 1 and Type 2 diabetes, who suffered no ill effects from the fasting, though they were monitored closely and had their insulin doses adjusted while fasting. The most common side effects of these prolonged fasts were similar to those from intermittent fasting, Varady said, such as headaches, insomnia and hunger. There were no serious negative effects in the studies, such as metabolic acidosis or death.

She did note that the participants in these prolonged fasts lost about two-thirds of their weight in lean mass and one-third in fat mass. This is the opposite of what happens most of the time during weight loss, where more fat is lost than muscle. It makes sense that these extreme fasts would have this result, she said, because "your body needs a constant intake of protein. If it doesn't have that, then it draws from muscles."



## All the immunity, none of the symptoms

Science Daily June 23, 2023

Worldwide, more than a million deaths occur each year due to diarrheal diseases that lead to dehydration and malnutrition. Yet, no vaccine exists to fight or prevent these diseases, which are caused by bacteria like certain strains of *E. coli*.

Instead, people with bacterial infections must rely on the body taking one of two defence strategies: kill the intruders or impair the intruders but keep them around. If the body chooses to impair the bacteria, then the disease can occur without the diarrhea, but the infection can still be transmitted -- a process called asymptomatic carriage.

Now, Salk scientists have found that pairing specific diets with disease-causing bacteria can create lasting immunity in mice without the costs of developing sickness, revealing a new potential vaccination strategy. Their findings, published in *Science Advances* on June 23, 2023, pave the way for the development of new vaccines that could promote immunity for those with diarrheal diseases and possibly other infections. "We discovered that

immunization against diarrheal infections is possible if we allow the bacteria to retain some of its disease-causing behaviour," says senior author Professor Janelle Ayres, Salk Institute Legacy Chair and head of the Molecular and Systems Physiology Laboratory. "This insight could lead to the development of vaccines that could reduce symptoms and mortality, as well as protect against future infections."

In 2018, Ayres' lab looked at how dietary interventions can create an asymptomatic infection, which Ayres calls a cooperative relationship between bacteria and host (the person or animal that the bacteria have infected) where the host does not experience any symptoms. They discovered that an iron-rich diet enabled mice to survive a normally lethal bacterial infection without ever developing signs of sickness or disease. The high-iron diet increased unabsorbed sugar (glucose) in the mice's intestines, which the bacteria could feast on. The excess sugar served as a "bribe" for the bacteria, keeping them full and incentivized to not attack the host.

This process produced long-term asymptomatic infection with the bacteria, leading the researchers to believe that the adaptive immune system (cells and proteins that "remember" infections) may be involved.

"Being able to generate lasting immunity against bacteria like *C. rodentium* or *E. coli* has not

been possible using established vaccination strategies. We wanted to figure out what mechanism was sustaining this lasting immunity, so we could use that mechanism to create an impactful solution to these diarrheal diseases," says first author Grischa Chen, a former postdoctoral researcher in Ayres' lab.

The researchers moved to figure out how the body suppresses infection symptoms, whether infection without symptoms can create long-term immunity, and whether that immunity is reproducible as a vaccination strategy.

The team compared mice with iron-rich and normal diets after *C. rodentium* infection to find whether the diet impacted symptomless infection. Immediately after infection, mice fed an iron-rich diet had no symptoms whereas mice fed a normal diet did have symptoms. All mice were then put on a normal diet to see whether the asymptomatic infection would last.

Mice with non-functional adaptive immune systems (the immune system that "remembers" previous infections), regardless of whether they had ever been on an iron-rich diet, could not continue to maintain a cooperative relationship with the bacteria.





Although the iron-rich diet suppressed symptoms immediately after infection, the adaptive immune system was required for lasting cooperation. Importantly, the mice with functional adaptive immune systems had the disease without any symptoms, with lasting immunity, as demonstrated by survival upon reinfection after a month.

Ayres and team concluded that an iron-rich diet alone can prevent bacteria from creating deadly symptoms in mice during active infection. But a functional adaptive immune system is required for immunity against future infection in the absence of dietary supplementation.

### Omega-3 fatty acids linked to slower decline in ALS



Science Daily June 21, 2023

People with amyotrophic lateral sclerosis (ALS) who eat more foods high in certain omega-3 fatty acids like flaxseed oil, walnuts, canola oil and pumpkin seeds may have a slower physical decline from the disease and may have a slightly extended survival.

The study, which looked at the survival of people with ALS over the course of 18 months, was published in the June 21, 2023, online issue of *Neurology*, the medical journal of the American Academy of Neurology. Researchers also found an omega-6 fatty acid may be beneficial. The study

does not prove that these omega fatty acids slow decline of ALS or extend survival; it only shows an association.

ALS is a rare, progressive neurodegenerative disease that affects nerve cells in the brain and the spinal cord. People with ALS lose the ability to initiate and control muscle movement, which often leads to total paralysis and death. The average life span after diagnosis is two to five years.

"The link our study found between diet and ALS is intriguing and suggests, but does not prove, that people with ALS may benefit from incorporating more omega-3 fatty acids into their diet," said Kjetil Bjornevik, MD, PhD, of Harvard University in Boston, Massachusetts, and member of the American Academy of Neurology. "It will now be important to conduct additional research looking specifically at the plant-based omega-3 fatty acid alpha-linolenic acid in people with ALS to further explore this possibility."

The study involved 449 people who had ALS with an average age of 58, who were followed over 18 months. Of the total participants, 28% died by the end of the study. Researchers looked at levels of omega-3 fatty acids in participants' blood. They divided them into four groups based on lowest to highest amounts.

Participants took a test to assess their disease progression and severity of symptoms. The test measured 12 aspects of physical function

including swallowing, speaking, chewing, and the ability to use muscles in the hands, arms, legs and torso, as well as respiratory function. Each category was scored from zero, meaning no ability, to four, meaning normal ability. Total scores ranged between zero to 48, with higher scores indicating better function and less severe symptoms.

Researchers found an omega-3 fatty acid called alpha-linolenic acid was the most beneficial. This acid is found in many seeds and oils, including flaxseed, walnuts, chia, hemp, and many common vegetable oils. Higher levels of a specific omega-3 fatty acid called eicosapentaenoic acid that is found in fatty fish and fish oil supplements was also associated with a lower risk of death during the study.

### Fewer meals may prevent Type 2 diabetes, obesity

Science Daily June 15, 2023

When intermittent fasting became all the rage among Hollywood celebrities, sceptics balked at the idea of skipping meals.

But new research from the University of Georgia suggests the celebs might not have been that far off.





The review found that a specific type of restricted eating may reduce the chances of developing Type 2 diabetes and improve your overall health. Known as time-restricted eating, this type of fasting means having regular but fewer meals, cutting out late-night snacks and not eating for 12 to 14 hours (often overnight).

The researchers found that time-restricted eating allows the body to relax and lower insulin and glucose levels, which in turn can improve insulin resistance, brain health and glycemic control. It can also reduce calorie intake by around 550 calories per day without the stress of calorie counting.

Previous studies have shown disruptions to sleep and meal schedules can change both the type and amount of bacteria and other microorganisms in the digestive tract. But fasting may positively alter the gut microbiome, potentially staving off inflammation and a variety of metabolic disorders.

Additionally, the review suggests time-restricted eating can help regulate hormones responsible for appetite regulation and energy levels.

Obesity may lead to a variety of health conditions, including Type 2 diabetes, heart disease and even some cancers. Fewer meals of high-quality food are

a good guideline for individuals at risk of developing Type 2 diabetes and obesity.

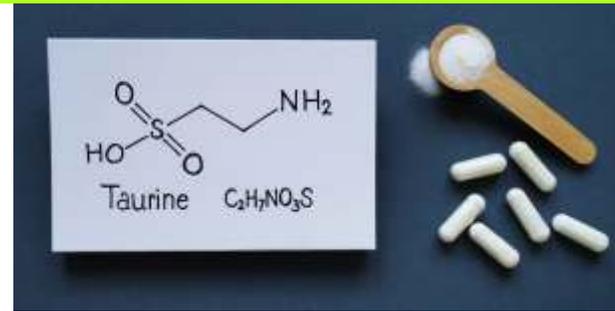
**Taurine may be a key to longer and healthier life**  
Science Daily June 8, 2023

**A deficiency of taurine -- a nutrient produced in the body and found in many foods -- is a driver of aging in animals, according to a new study led by Columbia researchers and involving dozens of aging researchers around the world.**

The same study also found that taurine supplements can slow down the aging process in worms, mice, and monkeys and can even extend the healthy lifespan of middle-aged mice by up to 12%.

The researchers started with close to 250 14-month-old female and male mice (about 45 years old in people terms). Every day, the researcher fed half of them a bolus of taurine or a control solution. At the end of the experiment, Yadav and his team found that taurine increased average lifespan by 12% in female mice and 10% in males. For the mice, that meant three to four extra months, equivalent to about seven or eight human years.

To learn how taurine impacted health, Yadav brought in other aging researchers who investigated the effect of taurine supplementation on the health and lifespan in several species. These experts measured various health parameters in mice and found that at age 2 (60 in human years), animals supplemented



with taurine for one year were healthier in almost every way than their untreated counterparts.

The researchers found that taurine suppressed age-associated weight gain in female mice (even in "menopausal" mice), increased energy expenditure, increased bone mass, improved muscle endurance and strength, reduced depression-like and anxious behaviours, reduced insulin resistance, and promoted a younger-looking immune system, among other benefits.

The researchers do not know yet if taurine supplements will improve health or increase longevity in humans, but two experiments they conducted suggest taurine has potential.

In the first, Yadav and his team looked at the relationship between taurine levels and approximately 50 health parameters in 12,000 European adults aged 60 and over. Overall, people with higher taurine levels were healthier, with fewer cases of type 2 diabetes, lower obesity levels, reduced hypertension, and lower levels of inflammation. "These are associations, which do not establish causation," Yadav says, "but the results are consistent with the possibility that taurine deficiency contributes to human aging."

The second study tested if taurine levels would respond to an intervention known to improve health: exercise. The researchers measured taurine levels before and after a variety of male athletes and sedentary individuals finished a strenuous cycling workout and found a significant increase in taurine among all groups of athletes (sprinters, endurance runners, and natural bodybuilders) and sedentary individuals.

"No matter the individual, all had increased taurine levels after exercise, which suggests that some of the health benefits of exercise may come from an increase in taurine," Yadav says.

### Colourful fresh foods improve athletes' vision

Science Daily  
June 8, 2023



The paper, which was published in *Exercise and Sport Sciences Reviews*, examines how a group of plant compounds that build up in the retina, known as macular pigments, work to improve eye health and functional vision.

Previous studies done by UGA researchers Billy R. Hammond and Lisa Renzi-Hammond have shown that eating foods like dark leafy greens or yellow and orange vegetables, which contain high levels of the plant compounds lutein and zeaxanthin, improves eye and brain health.

The reason why objects get harder to see and appear fuzzier the farther they are from our eyes is thanks in part to the effects of blue light. Many athletes already take measures to reduce the impact of blue light through eye black or blue blocker sunglasses, but eating more foods rich in lutein and zeaxanthin can improve the eye's natural ability to handle blue light exposure, said Harth. When a person absorbs lutein and zeaxanthin, the compounds collect as yellow pigments in the retina and act as a filter to prevent blue light from entering the eye.

"In a long series of studies, we have shown that increasing amounts of lutein and zeaxanthin in the retina and brain decrease glare disability and discomfort and improve chromatic contrast and visual-motor reaction time, and supplementing these compounds facilitates executive functions like problem-solving and memory. All of these tasks are particularly important for athletes," said corresponding author Billy R. Hammond, a professor of psychology in the Behaviour and Brain Sciences Program at UGA's Franklin College of Arts and Sciences.

This paper, Harth said, brings the research on these links between macular pigment and functional vision up to date and asks what the evidence suggests about optimizing athletic performance.



### Challenges for "every health system in the world" as over one billion predicted to have diabetes by 2050

23 Jun 2023 Nutrition Insight

Globally, diabetes is one of the leading causes of death and disability. Currently, half a billion people are living with the disease, and that number is expected to more than double by 2050, reaching up to 1.3 billion people, according to a new study in *The Lancet*.

"The rapid rate at which diabetes is growing is not only alarming but also challenging for every health system in the world, especially given how the disease also increases the risk for ischemic heart disease - caused by reduced blood flow to the heart - and stroke," says Dr. Liane Ong, lead author and lead research scientist at the Institute for Health Metrics and Evaluation (IHME) at the University of Washington's School of Medicine, US.

"While the general public might believe that Type 2 diabetes is simply associated with obesity, lack of exercise and a poor diet, preventing and controlling diabetes is quite complex due to several factors. That includes someone's genetics and logistical, social and financial barriers within a country's structural system, especially in low- and middle-income countries."

The study in *The Lancet* says that out of all global diabetes cases, 96% are Type 2 diabetes. It identifies high body mass index as the primary risk factor for developing the disease, followed by dietary choices, environmental or occupational risk, tobacco use, low physical activity and alcohol use.

“Some people might be quick to focus on one or a few risk factors, but that approach doesn’t consider the conditions in which people are born and live that create disparities worldwide,” says Lauryn Stafford, second author and Post-Bachelor Fellow at IHME. Stafford argues that those inequities ultimately impact people’s access to screening and treatment and the availability of health services. “That’s precisely why we need a complete picture of how diabetes has impacted populations at a granular level.”

Rising food prices are a global problem, and the government should ask supermarkets and multinational food manufacturers to do everything they can to make healthy food more affordable, details Burt. “The restrictions are a crucial component of the government’s evidence-based childhood obesity strategy, designed to work with existing location promotion restrictions and the delayed advertising restrictions to reduce excess and unnecessary calories in the diet. By postponing this policy,

the government has made it harder for people to buy healthier food.”

The government must also go further and implement policies limiting salt, sugar and saturated fat levels in food and drinks, given the strength of evidence linking these to ill health and preventable deaths, Burt stresses.

“However, continuing to delay planned evidence-based measures to stop people from getting obesity in the first place will simply add to the NHS workload. The only true way to reduce pressure on the NHS and cut waiting lists is for the government to implement promised preventative measures, including restricting advertising and multi-buy offers on unhealthy food.”

By Beatrice Wihlander

Plant-predominant whole-food diet could be “primary intervention” in fight against diabetes, experts find

22 Jun 2023 Nutrition Insight

Lifestyle and eating pattern changes may be the best option for Type 2 diabetes management, according to a recent review.

Moreover, the team of US-based researchers found that 37% of participants achieved

remission of the disease by eating healthy foods without including liquid meal replacements or enacting “severe” caloric restrictions. The results were obtained using a low-fat, whole-food and mainly plant-based diet. Out of the 59 participants, 22 achieved remission of Type 2 diabetes.

Recently, researchers found that poor and unhealthy diets led to an increase of 14.1 million new cases in 2018 alone and another study showed that even implementing more whole grains could save between US\$349 million and US\$1.2 billion in healthcare costs. The study, published in the *American Journal of Lifestyle Medicine*, included 50 diabetic patients aged 41 to 89 years. Many of the participants experienced significant reductions in body mass index (BMI) and lower fasting glucose levels. Furthermore, 22 of the patients met the criteria for full remission of the disease.

The researchers noted that most of the patients surveyed did not self-opt in the lifestyle change but were coached and led through by healthcare providers and wellness centres.

This emphasizes the need of caregivers to be knowledgeable in this area and to stress the necessity of physical exercise and proper diet.

Edited by William Bradford



# FOOD SCIENCE & INDUSTRY NEWS

## A 'pinch' of mineral salts helps the noncaloric sweeteners go down

Science Daily June 15, 2023

Perfect noncaloric replacements for sugar and high fructose corn syrup just don't exist yet.

For example, some alternatives have a lingering sweet aftertaste and lack a sugar-like mouthfeel, leaving consumers unsatisfied. Now, researchers in ACS' Journal of Agricultural and Food Chemistry propose adding blends of nutritionally important mineral salts to make noncaloric sweeteners seem more like the real thing. Taste-testers indicated that these blends gave zero- and low-calorie drinks a better flavour.

Sugar substitutes are often used in sodas, baked goods and frozen desserts, to appeal to people who want lower-calorie or low-sugar treats. But many natural or synthetic noncaloric sweeteners, such as stevia and aspartame, have a delayed sweetness, which lasts long after a food or drink is consumed. These substances also don't usually have the same mouthfeel as real sugar. Previously, Grant DuBois and

colleagues observed that sodium chloride and potassium chloride could accelerate the onset of sweetness and eliminate its persistence for one stevia compound, rebaudioside A.

They hypothesized that the salts compress the mucus hydrogel covering taste buds to allow rebaudioside A molecules to get through and then leave more quickly. But high concentrations were needed to achieve the desired effects, which led to off-tastes. So, the researchers wanted to test other mineral salts on commercially available noncaloric sweeteners to see if the products that they are used in could be improved.

In initial tests with a trained sensory panel, the researchers observed that calcium chloride, magnesium chloride and potassium chloride each separately reduced the perceived intensity of rebaudioside A after two minutes. However, again, high amounts of the mineral salt were needed to lower the intensity by more than 30%, which caused unpleasant saltiness or bitterness sensations.

Next, mixing the three taste-modifying salts had synergistic

effects, allowing the team to use lower amounts of each for the same effect. A blend of the potassium, magnesium and calcium salts reduced the lingering sweetness up to 79% and markedly increased the sugar-like mouthfeel of 10 noncaloric alternatives.

## "Piggy Sooy": Moolec Science harnesses molecular farming to grow pork protein in pink soybeans

27 Jun 2023 Nutrition Insight

Molecular farming pioneer Moolec Science has made strides in raising the ratio of pork protein it cultivates within its signature soybeans, coined "Piggy Sooy."

The "significantly high" amount of pork protein in the natural crop can even be seen in the pink colour of the beans. It reached a level of up to 26.6% of total soluble protein, four times higher than initially projected by the company.



Moolec hails its molecular farming method as among the “most valuable alternative technologies” to produce animal proteins, given that plants can function as animal protein factories in a more efficient manner than initially expected. The UK-based company is currently invested in producing several other meat proteins in plants as functional ingredients to improve the taste, appearance, texture and nutrition of meat alternatives.

While regular soybeans are a staple of plant-based meat alternatives, many of these formulations still involve a list of additives to achieve the authentic flavour and texture profile of real steak, bacon or cutlets. It is widely believed that bringing proteins closer to what is sourced from animals may lead to a more convincing selling point for consumers, in a sector that has significantly diversified with new offerings over the past year.

The crossover of animal proteins into the plant-based sphere - emulsifying two historically opposed categories - is a testament to the hybrid food innovation trend gathering pace.

By Gaynor Selby and Benjamin Ferrer

**“The cycle of life”:**  
**Highlights nutritional needs and common deficiencies for women**  
26 Jun 2023 Nutrition Insight

Actylis has released a White Paper on women’s nutritional needs and how they change throughout life.

The company highlights the need to supplement with iron, calcium, magnesium and other vitamins and minerals at different points in life. Due to female hormones, menstruation and menopause, nutritional needs differ with age. Moreover, getting all of the necessary nutrients from food may no longer be possible because of the current food system and busy lifestyles.

“Micronutrient deficiencies and inadequacies are a significant global problem, impacting health outcomes and increasing the risks of infection, disease, and even death. Outright deficiencies are more prevalent in the developing world, but inadequacies - where intake is above deficiency levels but below recommended amounts - are surprisingly common in developed countries,” stresses Santarelli of Actylis. Factors such as sex, genetics, chronic conditions and poor nutrient absorption - which can be particularly problematic with minerals - also come into play.

“In a perfect world, optimal nutrient intake would be achieved through a balanced, wholefood diet, but we’re dealing with the real world, where busy lifestyles might preclude cooking from scratch, access to healthy ingredients is restricted, or medications inhibit nutrient absorption. Supplements can contribute to correcting this nutrition gap and improving health

outcomes.

Women have largely been excluded from clinical trials, details Dumail. “There are noticeable data gaps across the entire data value chain regarding women’s health, with a medical and research model that tends to set men’s health as the benchmark.” Using men as a female nutritional benchmark excludes crucial variables such as the menstrual cycle and hormonal surges.

“Meeting female nutritional requirements from the typical diet alone can be more challenging than it is for men, making supplementation more of an imperative,” highlights Dumail. She says this is driven by a range of sex-based physiological, hormonal and neurological factors unique to women that tend to put them at greater risk than men of conditions such as osteoporosis or iron deficiency at specific life stages.

### Female nutrition throughout life

Santarelli adds that the most common nutritional deficiency in women is iron, especially during reproductive age from losses during menstruation and an inadequate intake from food. “Low iron status is associated with fatigue and cognitive problems. Iron requirements also increase significantly during pregnancy, with deficiency linked to adverse outcomes for both mother and baby.”





feed the world's growing population, Symrise aims to pioneer side stream upcycling, providing markets with access to greater quantities of ingredients while preserving precious resources.



In adolescence, adequate calcium intake is vital for long-term bone health, since around 90% of adult bone mass is laid down in a woman's body by age 18, she explains. "This paves the way for peak bone mass in the late 20s, which may be the best insurance against osteoporosis after menopause. Our unique, multi-amino acid chelated, bone-building formulations Calcitron and Cytocal support bone health and minimize the risks of osteoporosis later in life."

Later on, during perimenopause and menopause, women are particularly vulnerable to magnesium deficiency as the mineral helps maintain bone health, regulate blood pressure and support the immune system and has a beneficial role in inflammation. Santarelli exemplifies a recent study that found a 27% reduced risk of bone fractures in women with adequate magnesium intake.

By Beatrice Wihlander

### Valorizing side streams: Utilizes chicken and banana by-products to enhance circular economy

21 Jun 2023 Nutrition Insight

With continuous pressures on supply chains and the need to

The company's goal is "doing more with less," as it looks to achieve circularity with ingredients such as chicken and banana peel to extract the full value of its natural raw materials. "We source chicken parts from local food production. Only 53% of the chicken gets used as such in food like fillets, wings and drumsticks. We valorize the other half of the chicken, sourcing a variety of side streams, from bones to skin or carcasses. We process them as valuable ingredients, using only gentle, kitchen-like processes, such as various cooking technologies, extraction, hydrolysis and drying."

The results are aromatic broths, powders, purified fats and pet food palatability enhancers that enrich thousands of food, flavour and pet food applications, delivering the desired mouthfeel or even the taste of meat and umami. Chicken comes with the lowest carbon footprint of any type of meat. Greenhouse gas (GHG)

emissions from chicken, for example, are five times lower than beef. Also, chicken side streams come with a lower carbon footprint than primary streams.

### Banana side streams

One of the significant growth opportunities, and already a success story, says Yanez, relates to the valorization of banana side streams from Ecuador, most importantly banana peel.

"We are currently exploring several concepts that involve banana side streams. Upcycling food side streams into added-value products is playing right into the sustainability pillar at Symrise. We aim to accelerate our present and lay the groundwork for the future," he details. Moreover, Yanez explains that Symrise's business activities "ultimately depend on the responsible use and conservation of natural resources as well as the diversity of nature."

By Elizabeth Green





## Israel to expand alt-protein and fermentation scope with US\$13.8M investment

20 Jun 2023 Nutrition Insight

The Israel Innovation Authority has selected YDLabs, a food tech fermentation R&D centre, to establish permanent microorganism fermentation labs for the food industry.

YDLabs will establish a facility that will provide fermentation services to food tech companies at varying scales, ranging from ten liters to 20,000 liters, offering diverse services based on the current and future needs of the local food tech industry, subject to predefined conditions set by the research committee.

“We are pleased to confirm the selection of YDLabs and look forward to seeing the Israeli ecosystem benefit from infrastructure and services provided for scaling production to enable economic feasibility assessment, regulatory preparedness and more,” says Dror Bin, CEO of the Israel Innovation Authority.

“Israel has identified the food tech field as one of the areas to prioritize. Due to the lack of infrastructure and workforce, many ventures turn to service providers abroad, leading to early knowledge leakage and advancements in

regulatory frameworks tailored for other countries. With this initiative, we aim to change that as soon as possible.”

The main motivations driving and accelerating the development of technologies and products in this field primarily stem from concerns about environmental and climate impacts of increasing demand for animal-based and industrial agriculture-based food as part of the expected population growth, as well as fears of food supply security and its effect on the climate crisis.

To answer this need, there has been a significant growth of the alternative protein sector (including non-protein food components) using synthetic biology methods that employ engineered microorganisms as production systems (food colouring, structurally animal-like fats, enzymes for food production, flavour and aroma compounds, and more).

The field of alternative proteins can be divided into three main categories: 1. Plant-based meat and dairy substitutes, 2. Cultured meat

and dairy substitutes & 3. Proteins and various components derived from microorganisms through fermentation

Among these three categories, fermentation technology for food production is emerging as an up-and-coming market.

The fermentation facility will include equipment, human resources specialized in food fermentation, services enabling fermentation at pilot and demo scales, separation and purification services, analytics, assistance in food regulation and more.

In similar developments earlier this month, GEA opened a Food Application and Technology Center of Excellence (ATC) in Germany, slated as a central hub for piloting processes and products for the alternative protein industry.

This comes amid a growing shift to plant-based foods and the burgeoning cultivated meat sector. GEA says the research focus is turning to precision fermentation for milk proteins. One of GEA's initial customers in this field is a scale-up from Israel called Imagindairy.

[Edited by Elizabeth Green](#)





## Robocook: Culinary bots replicate recipes after watching videos

07 Jun 2023 Nutrition Insight

Robotic chefs could bring health and economic benefits if the technology is widely implemented.

Unlike humans - who can learn recipes by watching someone else cook or a cooking video - programming a robot to create various dishes is costly and time-consuming. However, new research shows that video content could be a rich data source for automated food production, enabling more accessible and cheaper robot chefs.

Researchers programmed a robotic chef to recreate eight simple salads from a cookbook. The robot could identify which recipe was prepared in a cooking video and make it. The system also learned a ninth recipe from only watching a video.

### New age kitchen

The robot determined which recipe was being prepared by identifying the ingredients and actions of the human chef.

Out of sixteen videos watched, the robot recognized the correct recipe 93% of the time, even though it only detected 83% of the human chef's actions. The robot could also see that making a double portion or human error was a variation, not a new recipe.

"We wanted to see whether we could train a robot chef to learn in the same incremental way humans can - by identifying the ingredients and how they go together in the dish," says lead author Grzegorz Sochacki from the University of Cambridge, the UK.

"It's amazing how much nuance the robot was able to detect. These recipes aren't complex - they're essentially chopped fruits and vegetables. Still, it was effective at recognizing, for example, that two chopped apples and two chopped carrots are the same recipe as three chopped apples and three chopped carrots."

The research team developed eight salad recipes and filmed themselves making these. They trained their robot chef through a publicly available neural network programmed to identify various objects, such as the fruits and vegetables used in the recipes - broccoli, carrot, apple, banana and orange.

The robot could identify objects and features by analyzing each video frame, such as ingredients and cooking equipment. It detected the demonstrator's arms, hands and face. It converted the recipes and videos to vectors and used mathematics to determine the similarity between a demonstration and the vector.

Future of robotics  
Food accelerator programs believe innovative start-ups, such as those piloting artificial intelligence and robotics, are crucial to developing sustainable food systems. The study's authors expect that cooking automation in homes and hospitality sectors offers benefits by reducing time spent on cooking and thus increasing access to high-quality meals.

The article concludes that more developments are needed to make the setup practical for kitchens. The system should be put into one machine-learning model instead of the pipeline system used in the experiment. Moreover, robotic control needs to be improved.

By Jolanda van Hal



# REGULATORY NEWS

## Spotlight on aspartame: Industry eager for safety clarification from WHO

30 Jun 2023 Nutrition Insight

Speculation is mounting over aspartame potentially being labelled as a "possible carcinogenic to humans" following reports that the International Agency for Research on Cancer, an arm of WHO, has completed a safety review and is on the verge of publishing a report.

"There is a broad consensus in the scientific and regulatory community that aspartame is safe. It's a conclusion reached time and time again by food safety agencies around the world. IARC is not a food safety agency," says the American Beverage Association. "The FDA says JECFA (Joint FAO/WHO Expert Committee on Food Additives) is better suited to assess any risk associated with aspartame. And in its letter to WHO, HHS (US Department of Health and Human Services) said, 'an IARC review of aspartame... would be incomplete and its conclusions could be confusing to consumers.' We [the American Beverage Association] share this concern."

The International Sweetener

Association (ISA) also released a statement saying that it joins food safety agencies across the globe in trusting the "scientific rigor" of the WHO's joint FAO/WHO expert committee on food additives and is awaiting the full publication of the report next month. However, the association also says that: "The ISA has serious concerns with preliminary speculation about the IARC opinion, which may mislead consumers about the safety of aspartame."

Back in 1981, the JECFA established an acceptable daily intake of aspartame of 40 mg per kg of body weight per day. To consume over that limit would require a huge daily consumption of Diet Coke or similar drinks. On 14 July, JECFA may change that risk assessment, or they may not. Reuters' sources don't appear to have given any information about that.

Oliver Jones, a professor of chemistry at the Royal Melbourne Institute of Technology, Australia, shares "We really need to wait and see the full IARC evaluation before we can make any firm conclusions. Without that, we are shooting in the dark. We don't know what the terms of the assessment were or what criteria they used to rule evidence in or out. What we

can say is that IARC generally reviews the existing scientific literature on a particular substance or process, then weighs the evidence as to the likelihood said substance or process may be able to cause cancer under certain conditions or exposure."

Jones further explains that in this case, the IARC is going to list aspartame as a 'possible carcinogen' - the same as it previously classified eating red meat and using mobile phones - which means there is some evidence that it can cause cancer in humans but at present it is far from conclusive.

Meanwhile, industry members and scientists are convinced that the prior research on aspartame being safe still stands and fears that the "misleading opinion" might drive consumers away from aspartame, which could lead to more sugar consumption.

John Sievenpiper, Professor in the Department of Medicine at the University of Toronto, says that aspartame has proven to be a safe tool to reduce calories and sugars in the diet and is one of the most extensively studied ingredients with over 40 years of high-quality science supporting its safety.

“While it appears IARC is now prepared to concede that aspartame presents no more of a hazard to consumers than using aloe vera, public health authorities should be deeply concerned that this leaked opinion contradicts decades of high-quality scientific evidence and could needlessly mislead consumers into consuming more sugar rather than choosing safe no- and low-sugar options - all based on low-quality studies,” says Kate Loatman, executive director at the International Council of Beverages Associations (ICBA).

By Beatrice Wihlander

**Editor’s note:** JECFA has concluded that the data evaluated indicated no sufficient reason to change the previously established acceptable daily intake (ADI) of 0–40 mg/kg body weight for aspartame. The committee therefore reaffirmed that it is safe for a person to consume within this limit per day.

**Study reveals 90% of global aquaculture faces “substantial risk from environmental change”**

28 Jun 2023 Nutrition Insight

A new study has shown that many of the world’s largest aquatic food producers are highly vulnerable to human-induced environmental change, with some of the highest-risk countries in Asia, Latin America and Africa



**demonstrating the lowest capacity for adaptation.**

The study, conducted by researchers at the University of California – Santa Barbara, US, shows that more than 90% of global “blue” food production, in both capture fisheries and aquaculture, faces substantial risks from environmental change, with several countries in Asia and the US set to face the greatest threats to production.

**Environmental stressors**

The authors behind the new peer-reviewed paper produced the first-ever global analysis of environmental stressors impacting blue foods’ production quantity and safety worldwide, ranking countries for the first time according to their exposure to key stressors. Seventeen stressors were surveyed, including algal blooms, sea level rise, changing temperatures and pesticide exposure.

“Environmental stressors do not care about national borders,” notes Ben Halpern, co-lead author and professor at UC Santa Barbara and director of the National Center for

Ecological Analysis and Synthesis. “Stressors get moved by air, water, species and humans, connecting land to sea and ecosystem to ecosystem.”

The paper cites species invasion, inland eutrophication

or algal blooms, ocean warming and sea level rise as the main threats to blue food production in the US, with freshwater and marine fisheries facing disproportionately large risks. The authors also argue that special attention should be paid to countries facing high exposure to environmental change yet needing adequate adaptation capacity, including Bangladesh, Eswatini, Guatemala, Honduras and Uganda.

**Diversified adaptation strategies needed**

The authors also underscore the need for diversifying blue food production in high-risk countries to cope with the impact of environmental change unless sufficient mitigation and adaptation strategies are adopted. Likewise, the paper highlights the urgent need for greater stakeholder engagement in understanding, monitoring and mitigating pressures on blue food production systems. Indigenous knowledge will be critical for strategic planning and policies to mitigate and adapt to environmental change, particularly for artisanal fisheries and heavy marine fisheries-dependent countries, such as Small Island Developing States.

Meanwhile, the development of alternative sustainable seafood products - including plant- and cell-based fish analogues - are gaining traction as industry looks to turn the tide on unsustainable fishing practices.

Edited by Elizabeth Green

## A new era: Companies receive landmark regulatory clearance for US cultivated chicken sales

22 Jun 2023 Nutrition Insight

Upside Foods can start commercial production and sales of its cultivated chicken in what's championed as a "historic step" in the US food industry after completing the pre-market regulatory review process.

At the same time, Good Meat, the cultivated meat division of food technology company Eat Just, has also received USDA approval for its cultivated chicken to enter interstate commerce. This is a watershed moment for the burgeoning cultivated meat, poultry and seafood sector, which is watching closely for what happens next and how American diners and consumers will react to the long-awaited commercialization of cultivated meat. Upside has already processed the first order of its cultivated chicken. The business model, for now, is to unveil the meat in limited quantities through select restaurant partners, starting with three-Michelin-star chef Dominique Crenn and his restaurant Bar Crenn in San Francisco.

### Comprehensive vetting

Good Meat has already received multiple regulatory approvals for its chicken in Singapore in 2020 and 2021. The chicken has been featured in fine-dining restaurants, Singapore hawker stalls, via

the foodpanda delivery platform and most recently by reservation at Huber's Butchery, one of Singapore's producers and suppliers of high-quality meats. Receiving a label approval from USDA means that Upside Foods has demonstrated full compliance with all pre-market requirements for labelling, including acceptance of the company's proposed label as not misleading. USDA also approves the name of the product, ingredient statement and handling instructions.

### How significant is the regulation?

Regulation of cultivated meat mirrors that of conventionally-produced meat. With conventional meat, the FDA oversees the safety of new ingredients used in meat and poultry products and regulates live animals to be used as food up until they are presented for slaughter. At the point of slaughter, the USDA takes over jurisdiction to oversee slaughter, meat processing, packaging and labelling. For cultivated meat, the FDA oversees the sourcing, selection and growth of the cells and all components and inputs used in the production process. The authority takes over when the cells are removed from the sealed cultivators, referred to as "harvesting."

### How is the cultivated chicken made?

Upside Foods takes a sample of cells and places them in a cultivator, where they are fed with a blend of nutrients to



multiply and grow. In two to three weeks, the meat is harvested and formulated. Making cultivated meat is similar to brewing beer, but Upside is growing animal cells instead of yeast or bacteria.

Good Meat also feeds cells in a clean, sterile environment, mirroring how an animal grows but without the slaughter, antibiotics or hormones. It sources cells from chickens and cows and "painlessly" extracts them from an egg or living animal.

Bruce Friedrich, president of The Good Food Institute, also applauds the US regulatory agencies, saying: "American consumers are now closer than ever to eating the real meat they love, that uses far less land and water than conventionally produced meat. By undergoing a comprehensive facility review process and meeting the highest regulatory standards, cultivated meat will provide consumers with a safe and trusted source of protein. As we navigate a future with increasing global demand for meat, it is crucial that governments worldwide prioritize cultivated meat as a solution that satisfies consumer preferences, supports climate goals and ensures food security for generations to come."

By Gaynor Selby



The European Commission's Green Claims Directive aims to weed out unsubstantiated label claims that can mislead consumers by giving a false impression of the company's environmental impacts or benefits - a practice known as 'greenwashing' - from credible and trustworthy eco-labels.

Leatherfood Food Research, a consultancy that provides scientific and regulatory guidance to the global food and beverage industry, said businesses that operate in the EU should act now to avoid potential reputational damage. Meanwhile, UK-based operations have been told that the Competition and Markets Authority is already enforcing its own Green Claims Code and announced in January 2023 that household products, including food and beverages, would be under scrutiny.

The consultancy conducted research in Denmark, France, Germany, Greece, Italy, Spain, Turkey and the UK among 10,234 adults to gauge consumer attitudes to green claims. The results showed that 37% of adults had purchased grocery products due to their green claims, while 34% said they had selected a different brand due to green claims, and 30% had chosen a product that cost more than alternatives perceived as less environmentally-friendly.

Mariko Kubo, head of scientific and regulatory affairs at the

consultancy, told DairyReporter: "Green claims are voluntary in the UK and EU, so in some cases the easiest option may be to not make any green claims at all until the legislation (particularly in EU) is clearer. Where green claims are made, they need to be presented in a specific, precise and unambiguous manner, without key information being omitted.

"All food business operators, including dairy and alt dairy producers, will need credible scientific evidence to support their green claims and should be prepared to share this in a clear understandable format in the event that the claim is challenged."

"They should also ensure claims are supported by validated data where appropriate. One common pitfall, specifically for green claims used in advertising but also relevant for claims on labels is not taking the whole lifecycle of a product/food into account when making the claim.

Asked how the UK Code compares to the EU directive, Kubo said: "The EU directive is still in draft form so we don't know what the final version will look like yet. However, there are common themes between the EU and UK, namely that claims must be clear, not misleading and backed with evidence. There is also a parallel in the proposed amendment to the EU's Unfair Commercial Practices Directive and the UK's Green Claims Code - environmental features.



## Who drives sustainable food choices? Exploring roles of legislation, consumers and businesses

20 Jun 2023 Nutrition Insight

Although sustainable food solutions have been expanding in the market, participants at this year's Sustainable Food Summit argued the food system still largely drives a loss of nature.

They discussed options to address this, while examining who should take a leading role. Livestock production, overconsumption and an over-reliance on a few crops have resulted in biodiversity loss.

"I think it's not one player, but I think that legislation will ultimately play an important role. But, in some ways, the private sector can move faster," Jurjen de Waal, Netherlands senior director at Mighty Earth, tells us. "It would be great to see companies taking a leading role, for example, committing to a goal like saying we want to produce more nature, daily. I think that could make a tremendous difference. Also, in reaching larger groups of consumers, giving people options. I think that could be a very important way to change."



# Sustainable

## Making green choices easier

Continuing the discussion on how industry can help ease eco-minded purchasing decisions, De Waal highlights it is essential to consider the setting and motives for people to choose greener meal options. In a recent study by Wageningen University & Research, the Netherlands, he notes that researchers used a restaurant setting to determine how to shift toward more plant-based diets.

In the restaurant's menu, they switched what was the standard option. In some weeks, they offered the meal with meat; in others, they used a vegetarian option as standard, without limiting people's choices. When meat was the standard option, a high share of people consumed meat, but while the plant-based version was the standard, most people opted for that version.

"It shows that there are things we can do and also the companies can do," De Waal continues. "I think you can set some of these goals as a company. And also realize that the way that we make decisions is heavily influenced by the environment that you can create where it's easier for people to make the sustainable choice."

By Jolanda van Hal

## FSSAI may bolster rules against food adulteration

By Rhythma Kaul Jul 24, 2023 Hindustan Times

India's food regulator is planning to crack down on adulterators and is looking to tighten regulations and raise awareness as the share of processed food increases in people's diets, according to officials familiar with the matter.

"Eating habits have changed over the years. Several new food items and additives have been introduced and there are newer technologies in the food industry, all of which call for updating our regulatory requirements," a government official said, requesting anonymity.

The Food Safety and Standards Authority of India (FSSAI) has been conducting surprise inspections across the country in recent times to rein in the problem of food adulteration. "There was a food regulators summit held recently that was another step in this direction, meant to look for ways in which regulators can act to make the whole food safety ecosystem better," the official said.

The FSSAI hosted a two-day Global Food Regulators Summit 2023 for the first time in India in the national capital, focusing on global food safety and regulatory frameworks. The summit has been a pivotal platform for international cooperation in addressing food safety challenges, according to



Suman Berry, vice-chairman at NITI Aayog, the government's think tank.

"Adulteration of food is a serious problem affecting the fabric of society, and the complexity of India's food landscape poses significant challenges which needs to be addressed," Berry said. "Collaborative work between the government, industries and other stakeholders are crucial to realize this endeavour. There is also a need for empowering consumers through awareness campaigns and promoting safe hygiene practices to reduce the risk of food-borne illness."

The regulator has also launched an initiative called Indian Food-o-Copoeia, based on the lines of the Indian pharmacopoeia. Like the pharmacopoeia, which has information on all drugs and their formulations produced, imported and sold in the country, the Food-o-Copoeia will include comprehensive information on all food and related items produced, imported and sold in India.

"It is a collection of all food safety and standards regulations for each food category as a monograph. The document is uploaded on the website for everyone to



### Guilt-free luxury: Consumer pursuit for healthy indulgence in the Middle East fuelling demand for clean label

By Pearly Neo 18-May-2023 - Food Navigator Asia

Middle Eastern consumers' rising interest in foods and beverages that are healthy and indulgent, yet still easy to recognise, have led to increased demands for brands to focus on clean label ingredient lists, according to Olam Food Ingredients(ofi).

It is well-known that the Middle Eastern region is emerging as one of the fastest-growing consumer markets due to rising incomes and population demographic changes.

In parallel with this has been the growth of health consciousness amongst consumers due to the impacts of the COVID-19 pandemic. This has culminated in many consumers in this region now looking for products that are able to provide them with the luxurious, indulgence experience they seek - yet are also satisfactory on the health and nutrition fronts, and to have the assurance of being able to ascertain this for themselves.



Minister for Health and Family Welfare, emphasised that "there will be no tolerance for food adulteration in the country. FSSAI has formed a team along with state

authorities to crack down on those who indulge in such malpractices. Large-scale testing would be carried out across the country, and action would be taken according to the Food Safety and Standards Act, 2006 (FSS Act 2006) against those found guilty," he stressed.

This comes after FSSAI announced on May 25 that it will be conducting nationwide checks on milk and dairy products such as khoa, chhena, paneer, ghee, butter, curd, and ice cream, as part of its ongoing efforts to curb adulteration of these foods. The checks will be done by collecting samples from both the organised and

unorganised sectors in all of India's states.

The new National Training Centre located at Ghaziabad, Uttar Pradesh, will roll out structured training programmes to provide instructions, practice sessions, and learning experiences. This dedicated facility aims to fill the knowledge and skills gap among stakeholders, and to develop a future-ready workforce committed to ensuring the safety and quality of foods for the Indian population.



access. This will be of great use to the industry but common people would also be able to access it," said G Kamala Vardhana Rao, chief executive officer at FSSAI. "Our teams have been working for the past six months to collate relevant data and put together this document." The document will be updated on a regular basis to provide up-to-date information on food items.

### FSSAI conducts nationwide checks to crack down on food adulteration, starts new training centre to raise safety standards

By Hui Ling Dang 22-Jun-2023 - Food Navigator Asia

The Food Safety and Standards Authority of India (FSSAI) insists it is adopting a comprehensive approach to eradicate food safety issues in the country, including large-scale testing on key commodities like milk and dairy products.

At the inauguration of FSSAI's new National Training Centre, Dr Mansukh Mandaviya, Union



“All of this has led to the rising importance of clean label in the Middle East, with more and more consumers now looking at the back of their products to check the ingredients list to see for themselves that the ingredients they see are ones they recognise and know the safety of,” ofi VP of Innovation Dr Antony JIX told FoodNavigator-Asia.

The key to note is that these consumers want to be able to indulge in their favourite foods and beverages, but to not feel any guilt about it - which means seeking that fine balance as well of a bit of indulgence, perhaps 25% and then 75% health.

“But the reason clean label is so important is because the consumers can check this for themselves on the labels, and in a region like the Middle East where spices are so important in local cuisines this is also a very crucial area to focus on. It is why we have made all our items here clean label, including the spices, and partner brands that design

their relevant products with our clean label ingredients can also be assured of the clean label aspect.”

## India to host global food regulators summit this week

July 18, 2023  
The Hindu Bureau

India is all set to launch its 'food-o-copoeia', a collection of safety and quality regulations for each food category would also be launched at the Global Food Regulators Summit, 2023, to be hosted by the country, announced the Union Health Ministry.

Health Minister Mansukh Mandaviya on Monday unveiled the logo of the summit to be held in Delhi and said that the event will provide a valuable platform for participants to deliberate on food safety and regulatory aspects.

“It will also provide an effective understanding of compliance requirements and mutual exchange of best practices, experiences and success stories on food safety

norms/regulations, explore opportunities to identify collaborative work areas to establish synergies among global regulators/agencies and develop tools and techniques for information sharing,” said the Ministry in its release.

The summit is expected to witness participation from various stakeholders representing a

range of countries, international organisations, and national entities. Food regulators from G-20 member countries will attend the summit, along with international organisations, as well as several food research institutes such as the World Health Organization (WHO), the Food and Agriculture Organization (FAO), Federal Institute for Risk Assessment (BfR) (Germany), the Centre for Food Safety and Applied Nutrition (USA), Health Canada, the Australian Institute of Food Safety and Technology, etc. These organisations will contribute their expertise and perspectives to the discussions, the release added.



**Food Law**

