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PFNDAI Bulletin

AUG 2020

FOOD, NUTRITION & SAFETY MAGAZINE

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PFNDAI Bulletin AUG 2020
FOOD, NUTRITION & SAFETY MAGAZINE

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Cover Design & Bulletin Layout by Ms. Leena Shanbhag

EDITORIAL

Draft regulations regarding Safe Food & Healthy Diets for School Children were notified late last year in order to ensure that students in schools eat healthy and nutritious foods. Some of the provisions are as follows.

There are some very good initiatives in this regulation but some problems too.

FSSAI would like healthy and nutritious foods to be served or made available to students in schools. The children's obesity problem is no longer confined to western countries but we also have this problem in our school going children.

They are spending far more time in front of TV or computer and play too much with their smart phones and spend quite less time on play grounds. They play more games and sports on screen rather than on grounds. They not only need to spend some calories there but also need to get fresh air in open and interact with their friends which is good for their mental health.

Because they spend less energy they need less food or calories with a power pack of nutrients.. Thus although at home they may get a diet which is supervised by parents, at school they get the access to some of the foods with high level of calories and sodium from the nearby vendors which may not be healthy.

FSSAI wants schools to ensure that in and around school, in 50 metre range no food that would have high levels of fat, sugar and salt would be made available or advertised.

We feel that schools have jurisdiction within school premises but going out to drive away vendors of HFSS foods is expecting too much. Schools may not be able to do it. It would need police or municipality to ensure this.

FSSAI is also expecting schools to register as FBO if it wants to offer any food in canteen or their cafeteria. This again may be a bit difficult for school to undertake this responsibility and they may simply stop giving food.

FSSAI is also expecting schools to give awareness education about food, nutrition, safety and health related aspects through nutritionists. This is an excellent idea and should be implemented immediately. There are many health professionals who are willing to take part in this kind of support. Students should learn at young age these aspects which greatly affect their health.

One more thing that must be looked into and that is tiffin or lunch boxes of students who get it from home instead of eating in canteens or roadside. Some studies have shown that these contain mostly wafers, biscuits, cakes etc. These are not nutritious foods although some of them may be. Teachers must see what students bring from home and they should interact with their mothers and tell them to include more nutritious foods in the lunch boxes of their child.

Overall this initiative is well-intentioned but there are some problems that need to be looked at.

Prof Jagadish Pai,
Executive Director,
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INDIAN EDIBLE OIL INDUSTRY: SUSTAINABLE GROWTH IN LIGHT OF COVID 19

(Human beings are gifted with a beautiful divine nature but we usually don't ever bother to appreciate its beauty. However, COVID has reminded us to value it. And now instead of neglecting its importance, it's the time to learn how to sustain it and make smart choices to lead a healthy life.)

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INTRODUCTION

Edible oils form an essential part of the modern diet. These oils play a big role as an energy source, and provide the body with many beneficial micronutrients.

The demand for edible oils in India has shown a compounded growth of 3.5% over the last 10 years and is estimated at 23 MMT for Oil Year (OY) 2020-21. India plays an important role in the global edible oil market, accounting for approx. 11 % share of consumption; 7% share of oilseed production; 5% share of edible oil production and 13.6% share of world edible oil imports. As per USDA estimates, India is the third largest consumer of edible oils (after China and the EU-27 countries).

India's annual per capita consumption has shown a steadily increasing trend from 4 kgs in the 1970s to 10.2 kgs in the late 1990s to current levels of 17.5 kgs. However, it still ranks well below the world average of around 24 kgs (per capita figures including consumption of bio-energy), thereby signifying the high growth potential of the industry.

Table 1: Statistics of Oil Industry – (Year 2018-19)

Particular	Qty In Lakhs MT	Consumption per annum in Kg (130 Cr Population Base)
Total Oil Demand	225	17.31
Import	150	11.54
Domestic Production	75	5.77
Refined oil	195	15.00
Expelled oil	30	2.31
Top 5 Refined oils	179	13.77
Palm Oil	90	6.92
Soybean oil	40	3.08
Sunflower Oil	25	1.92
Cotton Seed Oil	10	0.77
Rice Bran Oil	9	0.69
Top 4 Expelled oils	35	2.69
Mustard Oil	25	1.92
Coconut oil	4	0.31
Ground nut oil	4	0.31
Other	2	0.15

Source: The Solvent Extractors' Association of India: SEAI (http://seai.in/)

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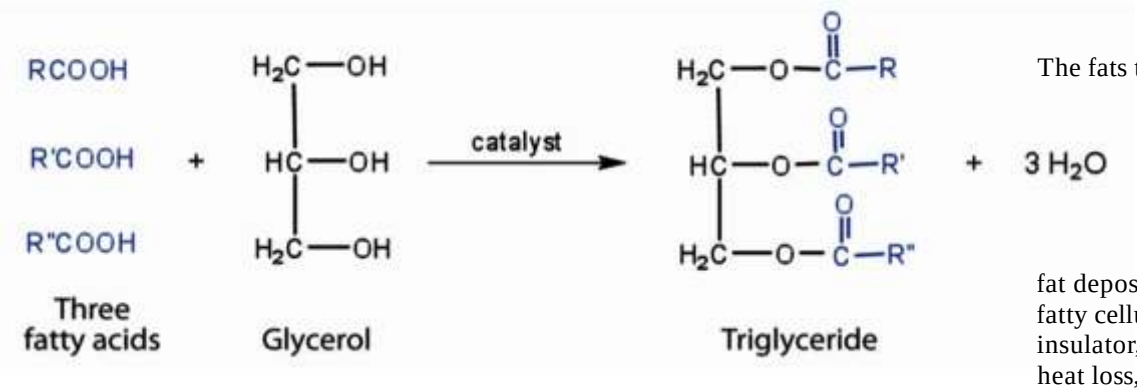


Thus, the oil industry is a sunshine sector for India. A large section of farmers are dependent on this sector and the Oil industry is impacting positively on creating a pool of wealth for India.

From the above statistics it is very clear that overall oil demand is increasing and without much increase in domestic production, this is resulting in net import of edible oil every year. Palm oil and Mustard oil are the top consumed oils in refined and expelled categories respectively.

Role of Fats and Oil in Human Nutrition

Fats and oils are constructed of building blocks called "triglycerides" resulting from the combination of one unit of glycerol and three units of fatty acids. When they are solid at normal room temperature, they are referred to as "fats," and when they are liquid at room temperature, they are called "oils." Fats and oils are classified as "lipids" which is a category that embraces a broad variety of chemical substances. In addition to triglycerides, it also includes mono- and diglycerides, phosphatides, cerebrosides, sterols, terpenes, fatty alcohols, fatty acids, fat-soluble vitamins, and other substances.

Health Importance of Oils and Fat

Fats and oils are recognized as essential nutrients in both human and animal diets. Nutritionally, they are concentrated sources of energy (9 cal/gram); provide essential fatty acids which are the building blocks for the hormones needed to regulate bodily systems; and are a carrier for the oil soluble vitamins A, D, E, and K. They also enhance the foods we eat by providing texture and imparting flavour. Fats and oils are also important functionally in the preparation of many food products. They act as tenderizing agents, facilitate aeration, carry flavours and colours, and provide a heating medium for food preparation. Fats and oils are present naturally in many foods, such as meats, dairy products, poultry, fish, and nuts, and in prepared foods, such as baked goods, margarines, dressings and sauces.

Animal fats used in foods include butter, lard, chicken fat, and suet. Cod-liver oil and some other fish oils are used medicinally as sources of vitamins A and D. Nutritionally fats and oils are valued as a source of energy. Because they contain less oxygen than other nutrients, they oxidize more readily and release more energy. Fats are digested in the human body chiefly by the enzyme lipase (in the pancreatic juice) aided by the bile.

The fats that are components of membrane formations of the cell and sub-cell organelles have important structural functions. Because of its extremely low heat conductivity, the fat deposited in the subcutaneous fatty cellular tissue acts as a heat insulator, protecting the body from heat loss, which is particularly important in the case of warm-blooded marine animals, such as whales and seals. In addition, fat deposits provide the pronounced elasticity of skin.

The above data clearly indicates that although each single edible vegetable oil has all the three major fatty acids group, they vary in their content depending on the oil. If only a single oil is consumed over a longer duration, it would provide the body with only a particular type of fatty acid which is dominant in that oil.

Need of Blending of Oils or Oil Rotation.

The blending of oils, specifically edible vegetable oils, means admixture of two or more edible oils to achieve the pre-set objective of obtaining a fair composition of fatty acids suitable for better health. Any blending provides an advantage as it would share the benefits of the composite ingredients from the different oils used in blending, depending on the blending ratio. The main objective of blending in other words is to improve the functional and nutritional qualities of edible vegetable oils; and, the

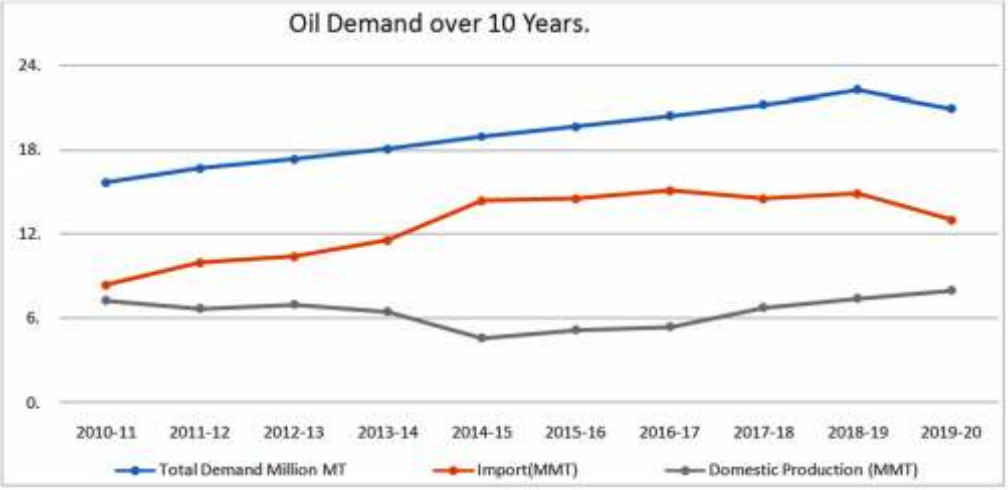
Table 2: Average composition of major fatty acid groups in various edible oils

Group	CO	PO	OO	MO	GNO	RBO	SeO	CnO	SyO	SFO	SafO	CanO	FxO
SFA	86.5	48.9	13.5	6.3	16.9	19.2	13.7	13.2	14.2	10.4	6.2	7.0	7.0
MUFA	5.8	37.0	73.9	59.2	46.2	39.3	39.7	27.5	23.2	19.5	14.4	63.0	19.0
PUFA	1.8	9.3	10.0	21.2	32.0	35.0	41.6	54.7	57.8	65.7	74.6	33.0	74.0

CO : Coconut oil; PO : Palm Oil; OO : Olive Oil; MO : Mustard Oil; GNO : Ground Nut Oil; RBO : Rice Bran Oil; SeO : Sesame Oil; CnO : Corn Oil; SyO : Soybean Oil; SFO : Sun Flower Oil; SafO : Safflower Oil; CanO : Canola Oil; FxO : Flax seed Oil

Ref NIN ICMR

constituent oils are intended to be complementary to each other in terms of meeting this objective. Blending also allows a particular oil to become more suitable for cooking, frying or any other processing operations thereby providing improved and extended physical, chemical and techno-functional properties. Currently as per FSSAI and AGMARK regulations for only blend of 2 oils are permitted.



Source: Solvent Extractor's Association of India: SEAI (http://seai.in/)

Edible Oil Industry Scenario of Last 10 Years

From the last 10 years, total domestic consumption of edible oil is steadily increasing with 3.5% annual compounded growth rate. Total consumption of Edible oil in the year 2010-11 was 15.7 MMT which has increased to 23 MMT, showing a net 49% growth in the last 10 years.

Similarly, import of edible oil has increased from 8.4 MMT to 15 MMT in the last 10 years which is a 79% net increase in the last 10 years.

However, domestic production has increased from 7.3 MMT to 8.1 MMT in 10 years, which is only 11 %. Thus it is very important to increase our domestic production through the National Mission on Oil Seed and Oil Palm (NMOOP) Program.

Table 3

Year	Total Demand MMT	Import (MMT)	Domestic Production (MMT)
2010-11	15.7	8.4	7.3
2011-12	16.7	10.0	6.7
2012-13	17.4	10.4	7.0
2013-14	18.1	11.6	6.5
2014-15	19.0	14.4	4.6
2015-16	19.7	14.5	5.2
2016-17	20.5	15.1	5.4
2017-18	21.3	14.5	6.8
2018-19	22.3	14.9	7.4
2019-20	21.0	13.0	8.0

Source: Solvent Extractor's Association of India: SEAI (http://seai.in/

Impact of Covid19 on Edible oil Industry & Demand.

In the last 4 months, 90% of India is locked down at home and literally the HoReCa business (Hotel and Restaurant) has come to a standstill. This has shifted the oil consumption demand from hotels to homes and has reduced the overall Oils and Fats demand by 20 to 25%. If we consider the last 7 Months for Imports of Edible oils (Ref SEA India Circular Dated 7-7-2020) it has been found that there is a reduction of 15% in Import of edible oil. Last year India had imported 9.4 MMT of oil during Nov 18- June 2019 and this year during the same period we have imported close to 8.0 MMT of edible oil.

Considering the Covid19 condition we can estimate that this year, by Dec 2020, India will import 13.0 MMT of Edible oil Vs. 15.0 MMT of oil of the previous year with a net reduction of 2.0 MMT of Oil. This is due to sharp reduction of demand by HoReCa Segment. During the last 7 months, Import data has indicated a reduction of Palm oil import but increase of Soybean oil and Sunflower oil import over the last year. This indicates a demand for soft oil over Palm oil. Soft oils are mainly used at home and Palm oil is majorly used in the HoReCa Segment. This may be a temporary phase; however the post-Covid scenario will not be different. If we consider the next 5 year of Edible oil demand for India based on the last few years of data, Indian oil demand is growing steadily with over 3.5% compounded growth rate. But in the Post-Covid19 scenario we can estimate that overall oil consumption will grow with 2% annual growth since consumers will shift to lesser consumption of Oils and Fats overall. So if we consider 2% growth rate on base data of 21 MMT, in the next 5 years India will need a total of 28 MMT of Edible oil, which means an additional 5 MMT of Edible oil in the next 5 Years.

FSSAI Eat Right Program and Edible Oils

FSSAI has launched its very important program - the 'Eat Right Movement' 3 years back and consumers are now more conscious about what they are eating. Covid-19 has also increased the Google searches on healthy oils and as discussed above, now the overall oil demand will reduce by 2 MMT this year over last year. Also what we have observed is that consumers are looking for healthier choices of Oils and Fats and lots of innovation will be demanded.

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Kachhi Ghani, Virgin oils, newer blends, Organic oil, Oil analogues, Speciality Oils and Fats, etc. will be in demand since consumers will prefer quality over quantity. (Ref https://www.researchandmarkets.com/reports)

Table 4 - Top Refined oils of INDIA

Name of Refined oil	Quantity in Lakhs MT	Percent of Total
Top 5 Refined oils	179	13.77
Palm Oil	90	6.92
Soybean oil	40	3.08
Sunflower Oil	25	1.92
Cotton Seed Oil	10	0.77
Rice Bran Oil	9	0.69

Source: SEA India 2017-18

From Table No 1 it is very visible that the main oil which comes to India is Palm oil (40% of total oil demand or 65 % of total Oil Imports).

From the above table it is very clear that out of 17 Kgs of oil which every Indian consumes per year, 7 Kgs is Palm Oil and 4 Kgs is of Soya Oil (Table 3). Palm oil is mostly imported. In the total share of refined oil, Palm Oil is number 1 with 46% and Cotton seed oil and Rice bran oil are at 5% each and have scope to increase.

From the above table it is clear that Mustard oil contributes to 67% of total Expelled oil consumption and on an average, India eats 1.5 Kgs Mustard oil/per person/per annum. Coconut and Ground nut are very little as compared to Mustard.

Table 5 - Top Expelled oils of India

Name of Expelled oil	Quantity in Lakhs MT	Percent of Total
Top 4 Expelled oils	35	2.69
Mustard Oil	25	1.92
Coconut oil	4	0.31
Ground nut oil	4	0.31
Other	2	0.15

(Source: SEA India 2017-18)

Considering the impact of COVID-19 scenario this year (2020), overall Indian oil demand remains at 21.0 MMT out of which Import will be of 13.0 MMT and 8.0 MMT will be domestic production. Even if we consider the Indian oil demand which will increase with 2% annual growth rate for the next 5 years, we will need an extra 1.0 MMT of oil every year. We need to find a solution locally or through import. Thus the National Oil Mission program would be important for India for the next 5 years. This year, in the last 7 months of data we have observed that Soya oil and Sunflower oil import has increased and Palm oil import has decreased. This trend may continue for the next 6 months but Palm oil would be the number 1 imported oil for India. We will be dependent on Palm oil due to its economic feasibility and availability. We have to agree that from the last 10 years, oil prices are under control due to the import of edible oils (Palm, Soya Oil & Sunflower oil) and that has kept a check on inflation also.

Nutritionists, health and nutrition associations and even the World Health Organization recommends to reduce and replace the consumption of excess saturated fat with unsaturated fatty acids. As a result, daily diet should be designed in such a way so as to consume a balance of saturated and unsaturated fatty acids. Generally speaking, by the classification of oil basis fatty acids, palm oil is SFA-rich oil; groundnut oil, olive oil, mustard oil and rice bran oil are MUFA-rich oils, while sunflower oil, safflower oil, soybean oil and corn oil are PUFA-rich oils. Hence, any one particular oil is not rich in all essential fatty acids and every oil has its unique triglyceride and non-glyceride composition, for which one should be mindful while selecting oil for consumption purposes. Eating only one type of oil is not good nutritionally.

In line with that, FSSAI has taken up the responsibility to protect consumer interests by disseminating awareness. The 'Eat Right India Movement' is one of the initiatives which is started with the intent to disseminate awareness among consumers about making informed and healthy choices. Swasth Bharat Yatra was launched to amplify the Eat Right India Initiative in order to spread the message "Eat Safe, Eat Healthy".

This has been a collaborative approach by engaging everyone starting from citizens, professionals, industry members, government officials, associations, etc. to create a sustainable culture and habit of choosing healthy and safe food by promoting awareness. The initiative was even provided with a slogan which is "Aaj Se Thoda Kam", inferred as reducing the consumption of fat, salt, sugar to a certain level to lead a healthy life. Government has also taken initiative to stop the loose oil sell which is good initiative considering the rampant adulteration on the loose oil and consumer safety. This will have positive impact on legitimate packed oil sector and ensure product safety.

Hon. PM of India has launched 'Atma Nirbhar Bharat' and 'Vocal for Local' programs and hence we need to keep a check on total imports and increase the production of domestic oil seeds. Hence National Oil Mission Programs are very key programs for India for the next 5 years.

National Mission on Oilseeds and Oil Palm (NMOOP)

In order to meet the demand of edible oil in the country, the Government of India has launched the National Mission on Oilseeds and Oil Palm (NMOOP) from April, 2014. Under NMOOP, three Mini Missions are being implemented i.e. Mini Mission-I (MM-I) on Oilseeds for increasing production & productivity of nine oilseed crops (7 edible oilseeds - groundnut, rapeseed & mustard, soybean, sunflower, sesame, safflower and Niger; two non-edible oilseeds - castor and linseed), Mini Mission-II (MM-II) for sustainable production of oil palm including area expansion and Mini Mission-III (MM-III) on tree borne oilseeds (TBOs) to enhance area under TBOs with the focus on utilizing wastelands.

Under all these missions, various assistances were provided for planting materials, supplying mini kits, plant protection equipment/ chemicals, micronutrients, irrigation devices, training to farmers, etc. In order to provide remunerative prices to farmers, Government declared Minimum Support Price of oilseeds well before the cropping season. The export of edible oils has been banned (except certain exemptions) w.e.f. 17.03.2008 to ensure smooth availability of edible oil In India.

Action Plan 2025 Edible Oil Mission (5 x 5 program – additional 5 MMT in 5 years)

Based on the earlier data which we have seen, India needs around 28.0 MMT of Edible oil by 2025 so around 5 MMT in next 5 years. This translates to 1.0 MMT every year. Current Import is 13 MMT and domestic production is of 8.0 MMT. So our action should be to increase 1.0 MMT of domestic production every year. This can be achieved by taking some key steps as part of National Oil Mission program and by bringing Yellow (Oil) revolution in India for the next 5 years.

Some action points-

1. Increase the production of alternate oil sources viz. Rice bran oil, Cotton seed oil and Minor oils to fullest. (1.5 MMT oil)

Today Rice bran oil is getting popular due to its health benefits and the current production of Rice bran oil is around 9.0 to 10.0 Lakh MT per year. Considering the current Rice bran production, we process somewhere around 50% of Rice bran and if we encourage and tap all available Rice bran in India, we can reach up to 17.0 Lakh MT of Rice bran oil every year. Same is the case with cotton seed oil. Current production of 10.0 lakh MT of cotton seed can be increased to 18.0 Lakh MT if we tap all resources. Then there are some minor oils and fats like Salseed fat, Mango Kernel fat, Kokum fat, Dhupa fat and Phulwara fat with a current production of around 0.5 to 1 lakh MT per year. This production can be increased to 2.0 to 3.0 Lakh MT per year. Thus, from all above data, with proper focus and firm practices we can easily add close to 12 to 15 Lakh MT of Oil/Fat every year in the next 5 years.

2. Mission Mustard, Groundnut, Soya oil and Sunflower oil (2.5 MMT)

We should give proper attention to productivity and quality of oil seeds for major oils in India and shift acreage from Wheat & Rice cycle to Soya/SF/Maize and Mustard in Punjab & Haryana through incentives along with Tax benefit for Oilseed Extension Programme. This focus will surely increase 2.5 MMT of oil annually in the next 5 years.

3. Declare Oil Palm as a Plantation Crop & Exempt land suitable for oil palm from land ceiling act (1 MMT)

We can expect 1 MMT of additional oil from domestically cultivated Palm source over the next 10 years since gestation period is four years form plantation.

Thus, by adopting the above suggestions, we can expect an additional increase of 5.0 MMT of domestic edible oil and which will keep the import of edible oil in check.

Conclusion

Oils & Fats play a big role as an energy source, and provide the body with many beneficial micronutrients. FSSAI has launched the Eat Right Program and thus eating a balanced fatty acid diet is very important for optimum nutrition. India with its 130 Crore Population needs around 23.0MMTof edible oil every year and 70% of it gets imported. Due to the Covid19 situation since Most of the hotels and restaurants are closed for last 4 months and people are not eating out, overall Edible oil demand has reduced and it is expected that this year we will consume 2.0MMT of less oil over the last year. This will decrease the imports of edible oil this year by 2.0MMT and this data is also supported by looking at the last 5 months of imports. With the Covid-19 scenario, consumers are shifting to healthier choices and the acceptability of Kacchi Ghani, Organic oils, softer oils and Blended edible oil is increasing so good scope for Innovation in future. Also imports of softer oil like soya oil and sunflower oil is increasing over Palm oil. National Oil mission is a very important mission for India and with proper focus and attention we can surely achieve additional 5.0MMT of edible oil in the next 5 years annually (5X 5). This will keep the import numbers under check and it will help the slogan of 'Atma Nirbhar Bharat'. The 'Eat Right India' program of FSSAI and the Covid-19 scenario has increased the awareness of healthier options and the demand for organic oils, Kacchi ghani oils, Blended oils and innovative oils and Fat products. Though India is a net importing country, with proper implementation of National Oil Mission Program we can achieve 5.0 MMT of additional oil production over 5 years annually.

YOGHURT – THE GROWTH ENGINE FOR DAIRY IN APAC

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Fermented dairy is the generic name for a category of products such as yoghurt, kefir, cheese, buttermilk etc. This generic name is derived from the fact that the milk is inoculated with a starter culture which converts part of the lactose to lactic acid.

Fermented dairy products, have been used for thousands of years to preserve milk as during the fermentation process, the lactose breaks down into lactic acid. This acidification inhibits the proliferation of pathogens that cause spoilage while releasing anti-microbial bacteriocins, thereby making it less perishable, more transportable, and more digestible. This processing of milk was an important development in early agriculture, which can be dated back to the sixth millennium BC in Northern Europe (1).

The typical taste of the product depends on type of lactic acid bacteria used as that defines the substances formed in this process. Mostly we see the production of Diacetyl, acetaldehyde and carbon di oxide while in products like kefir we have production of ethyl alcohol as well due to the use of yeasts.

Health Benefits of Fermented Dairy

Fermented foods and beverages have long been thought to provide health benefits. Potential health benefits of fermented foods include a reduced risk of hypertension, diabetes, obesity, high cholesterol, diarrhoea, thrombosis, and so on. Through their content in calcium, phosphorus, proteins, and micronutrients, dairy products play a role in the control of bone homeostasis. One explanation for the health benefits provided by fermented foods relates to the bioactive compounds formed during fermentation.

With fermentation, the levels of many vitamins such as vitamin B2 (riboflavin), vitamin B9 (folate),vitamin B12, and vitamin K in foods are increased. Melatonins synthesized, as well as GABA, which regulates blood pressure and protects against cardiovascular disease and cancer. Exo-polysaccharides, which have cholesterol-lowering, immune-modulator, antioxidant and anti-cancer properties, are generated, and a variety of bioactive peptides such as anti-hypertensive, anti-cancer, anti-inflammatory, anti-diabetic, ACE-inhibitory, anti-microbial, anti-adipogenic, anti-mutagenic, anti-thrombotic, and anti-atherogenic peptides are produced. The most well-known of these peptides are VPP and IPP, lacto-tripeptides produced during fermentation of milk that have anti-hypertensive and ACE-inhibitory effects. According to the European Food Safety Authority (EFSA), the recommended daily consumption of these lacto-tripeptides is at least 3 mg to keep blood pressure at normal levels. While many potential health benefits are attributed to fermented foods and beverages due to the biologically active peptides, vitamins, and other compounds produced by the bacteria responsible for fermentation. However, there is a need for further studies on the level of consumption necessary to see these health benefits. (2)

Yoghurt – The growth engine

The health benefits of fermented dairy products along with the rising health awareness amongst the consumers has led to large absolute value growth of yoghurt and sour milk products in China, India and Japan, overshadowing the growth in drinking milk products in several other markets, including India (3).In India, yoghurt and sour milk products recorded retail value growth of 26% to reach approx. INR 250 billion in 2019.

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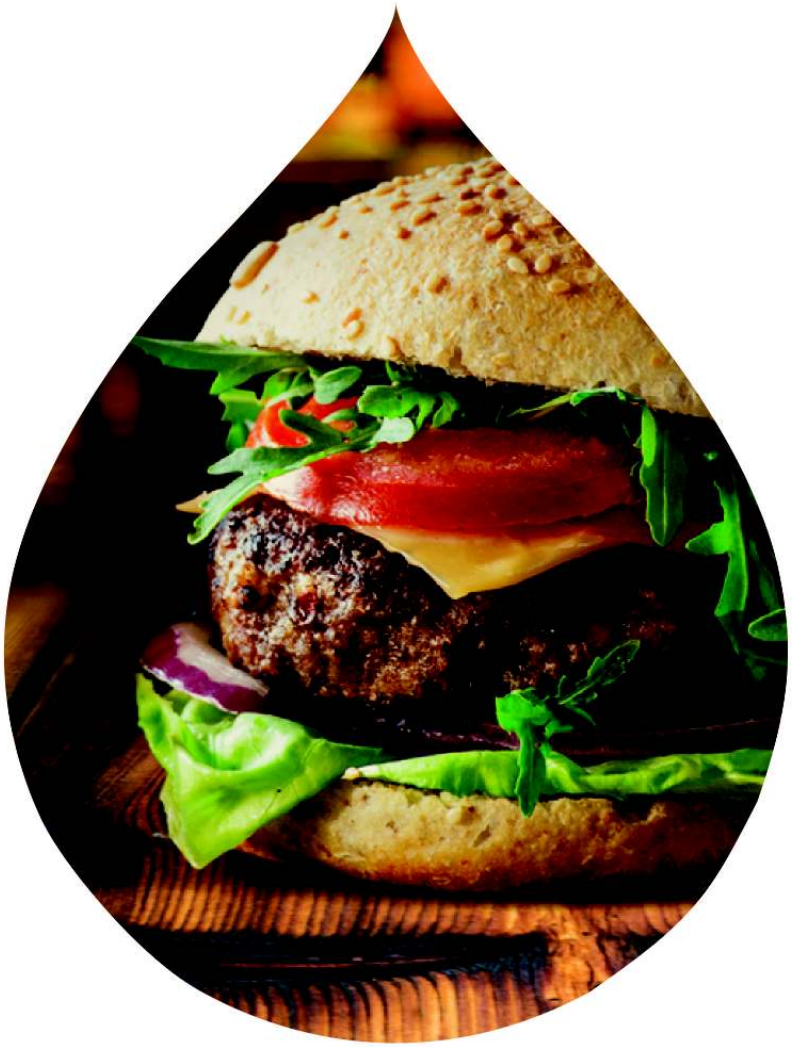

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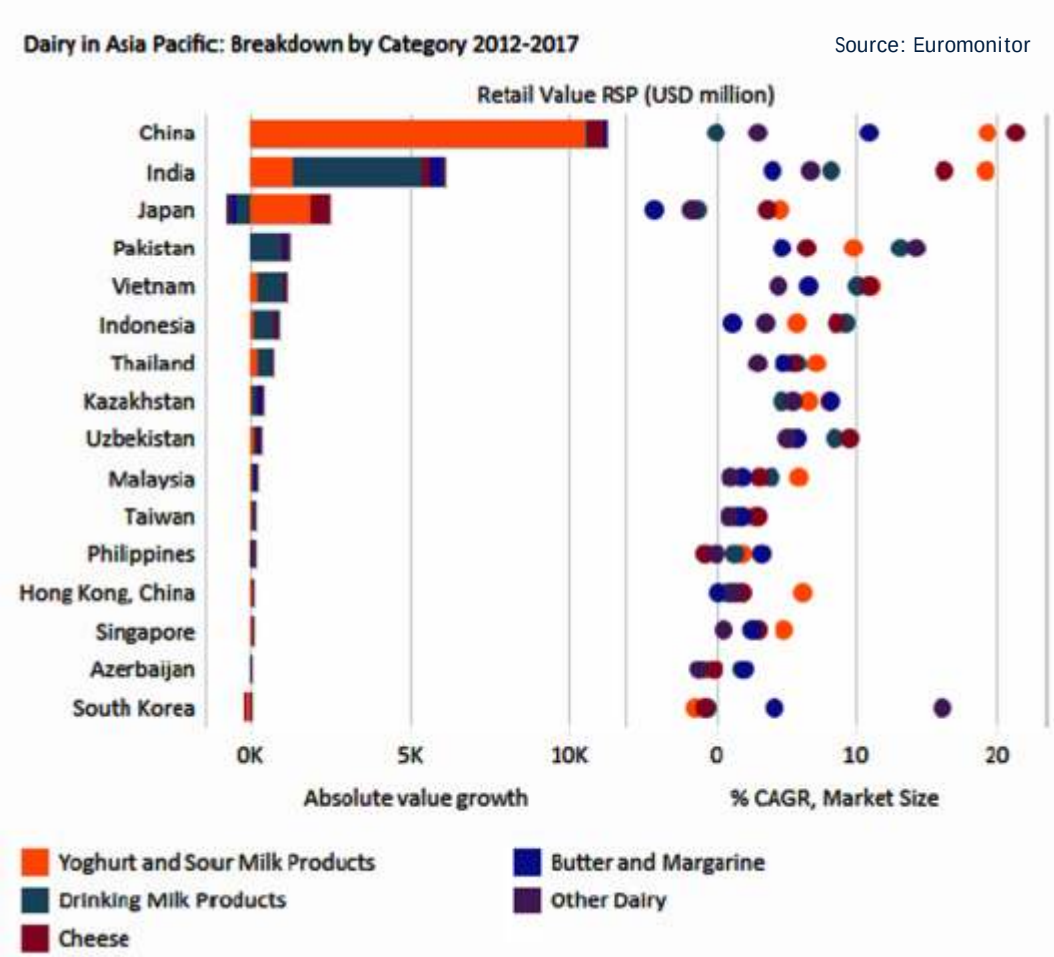


Hence it is prudent for the manufacturers to continue to focus on this category for growth.

Yoghurt is the best known of all fermented milk products, and the most popular worldwide. Within the fermented category, yoghurt presents a big opportunity for growth for manufacturers, including in India. While European markets maintain the highest consumption of spoonable yogurt in retail, value growth is expected to come from low consumption markets, like India and China (4).

Formats of Yoghurt

1. Set Yoghurt – This type of yoghurt comes with a set consistency and is incubated and cooled in the pack itself.
2. Stirred Yoghurt – This is set in the tanks and then the mass is broken up by stirring before packing.
3. Drinking yoghurt – This is similar to stirred yoghurt but of slightly thinner consistency. It is usually packed in bottles or Tetrapak.
4. Greek Yoghurt – It is a term that is loosely used for a concentrated yoghurt, which is made by either the straining process or the reconstitution process.
5. Frozen yoghurt – This is incubated in tanks and then frozen.

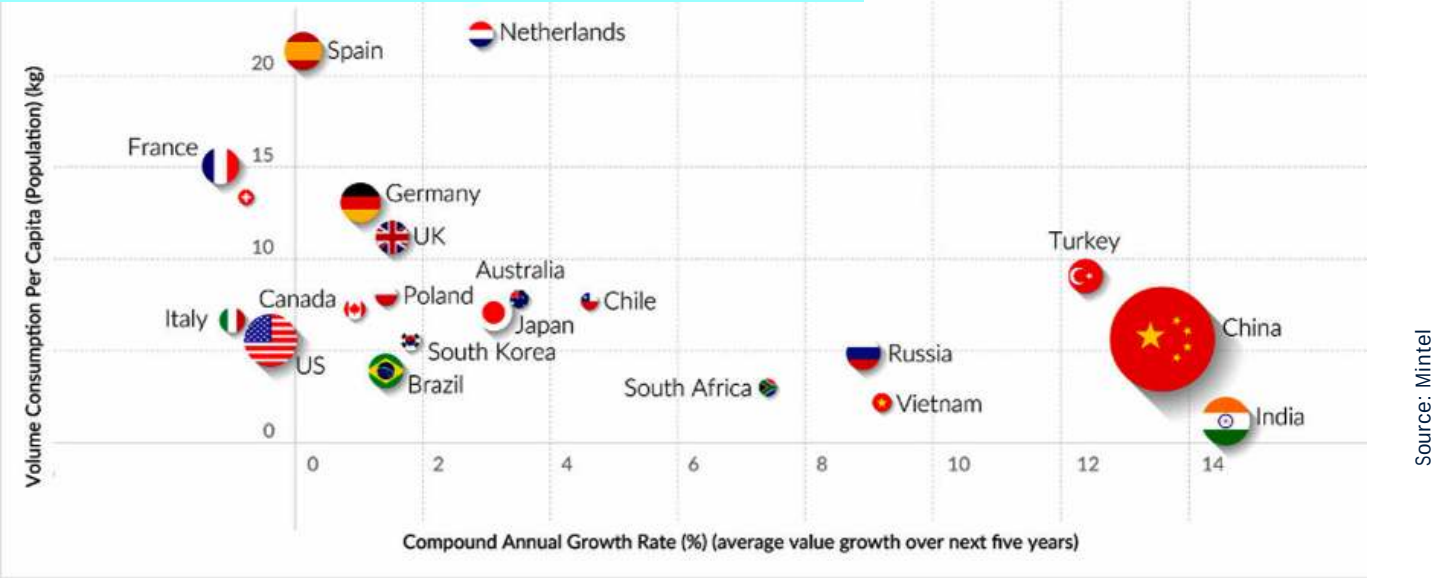
Let's talk some more about Stirred yoghurt in the Indian context.

Stirred Yoghurt with Fruits

As per FSSAI, yoghurt means a coagulated product obtained from pasteurised or boiled milk or concentrated milk, pasteurised skimmed milk and / or pasteurised cream or a mixture of two or more of these products by lactic acid fermentation through the action of Lactobacillus bulgaricus and Streptococcus thermophilus. The microorganisms in the final product must be viable and abundant. The fruits are generally added as a fruit preparation. The fruit yoghurt needs to have more than 1.5% fat, more than 8.5% SNF and more than 2.6% milk protein. The current trend in the stirred yoghurt category is to make it a thick and indulgent product by concentrating it and taking it towards the "Greek Yoghurt" space. This type of a product typically has 6% protein and allows the manufacturers to make a claim on high protein.

This category of yoghurt is rapidly gaining relevance with the consumers in India. Curd has been a staple for Indian consumer from time immemorial and hence stirred yoghurt is a logical extension for the consumer to try something that typically lies in the healthy indulgent space. As per an estimate, in India, about 20% of the consumers eat packaged flavoured yoghurt. Some of the reasons of this increasing relevance with the consumers are:

1. Focus on health: Yoghurt has been known to be good for building immunity and for good gut health. At the same time, Calcium and protein are other existing nutrients in the product that can be leveraged by yoghurt brands. With growing evidence of the link between protein and healthy ageing, science can back up brands that are trying to encourage senior consumers to eat more protein, and therefore delay the onset of age-related muscle loss.
2. Healthy option for lactose-intolerant: A lot of people are lactose intolerant and hence tend to stay away from dairy and dairy products. However, fermented dairy, like stirred yoghurt with fruits, involves breaking down lactose into lactic acid and hence is a good option for such consumers.
3. Healthy Hack for Kids: Parents worry that their children are not getting enough vitamins and minerals from their diet. Therefore, they are open to more fortified food for children. In this context, stirred yoghurt with fruits is seen as a healthy offering which comes with tasty Indulgence that kids will eat happily. As per a study by Mintel,



over half of Indian parents with children aged 5+ think that packaged yogurt/curd is good for children.

4. Indulgence for Gen Z: To appeal to the sweet tooth of the next generation, brands need to deliver indulgence from unique flavours, and underplay any nutritional cues. Products also need to be shareable in real life (with friends) as well as in virtual life (as an Instagram picture). This is where stirred yoghurt with fruits fits very well [5].

5. Dairy is affordable: In India, dairy as a category is inherently considered as healthy. While buying supplements for health is a very costly proposition, dairy is considered to offer the health benefits at much lower costs. At the same time, dairy is a good vehicle for adding value through fortification or through use of specific functional ingredients like probiotics and traditional health ingredients.

Factors affecting quality of Yoghurt

Some of the key quality attributes that a consumer actively looks for are the appearance, colour, flavour, thickness, aftertaste and no whey separation. It is important to ensure that all the parameters in the manufacturing and distribution are controlled effectively to delight the consumer every time. Some of the key factors/steps that can impact the quality of stirred yoghurts are:

1. Milk Quality: The milk used for yoghurt should have low bacterial count. It should be free from contaminants like antibiotics and other chemicals as that can impact the performance of the culture and hence the setting of the yoghurt.

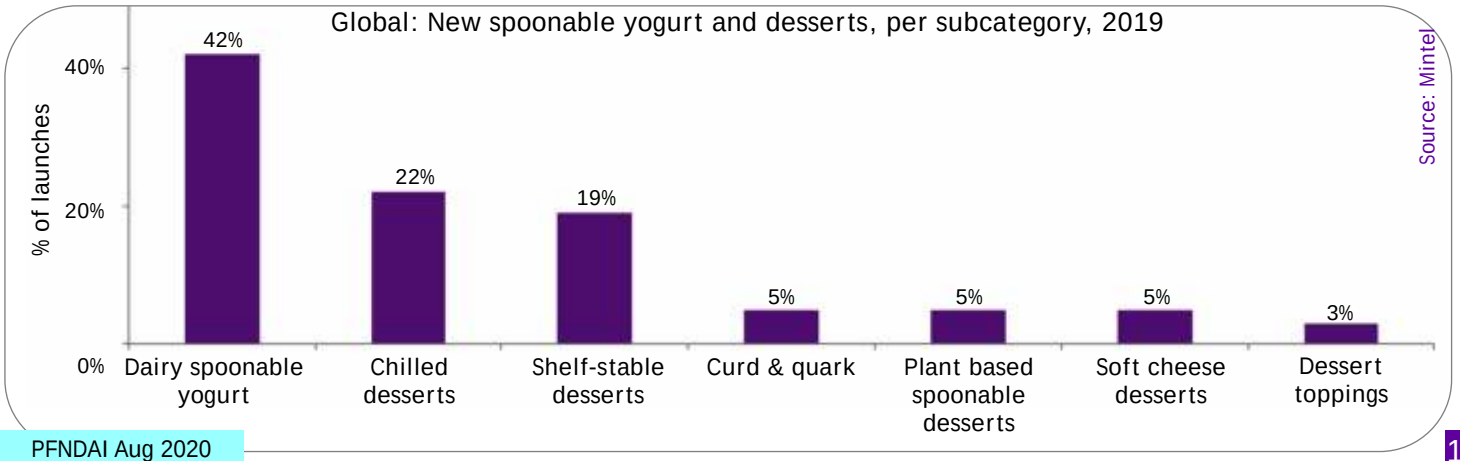
2. Pressure and Temperature during smoothening process: While breaking and smoothening of the mass it is important to maintain the right temperature and the pressure as this will impact the consistency of the final product. This step is very critical.

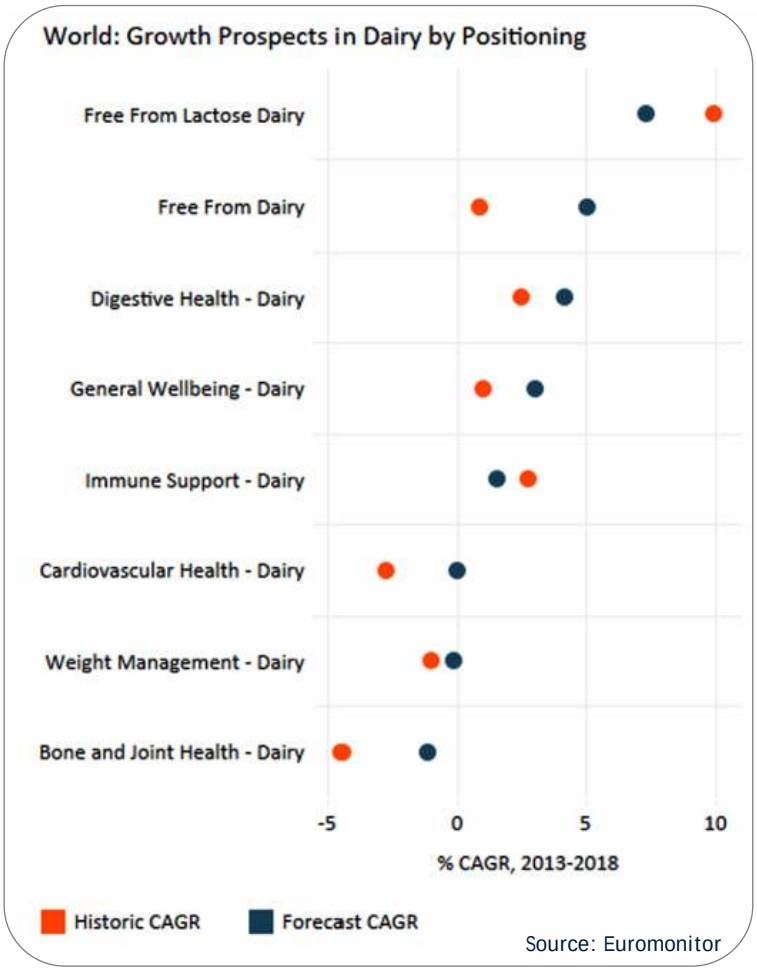
3. Mixing of the fruit: It is important to control the agitator speed as well as the agitation time to ensure that the mixing is efficient and at the same time there is no layer separation.

Opportunities in Stirred category

The yoghurt category has demonstrated a very strong growth in the past and it is projected to continue its strong performance into the future also. It is no surprise that dairy-based spoonable yoghurts dominate innovation in the yoghurt and desserts category.

In India, the demand for this segment is primarily driven by urban and semi-urban areas. Two big factors driving this growth include the young who are willing to experiment and increasing health consciousness amongst consumers. Yoghurt with fruit pulp is competing with ice cream and is seen much healthier. As per an estimate by Euromonitor, the consumption of yoghurt in India will be more than double in next five years.





Some of the trends to evaluate for the manufacturers are:

1. Natural means premium: There is an opportunity to play up the No additives, No preservatives in view of the consumers looking for more natural options. Also, ingredient transparency can accentuate natural attributes.

2. Probiotic 2.0: The importance of maintaining a healthy gut/brain axis is rising and hence it offers a significant opportunity for the future.

3. Multi textured experience: The method of addition of fruit offers an opportunity to offer a different sensorial experience to the consumer. Real fruit could be added and mixed all through to give a 'bite', or it could be a layer of jam at the bottom with fruit chunks across or a fruit layer on the top of the yoghurt.

4. Leverage the 'health positions': Yoghurt has historically been known to be positioned for the digestive health. At a global level. the growth rate of this positioning will continue to be high at about 4% in next few years. "Free from Lactose" is another positioning that will see a strong growth of 5% and is a big opportunity in the medium term [6].

It is not often that we come across a category that is indulgent and yet is healthy. In any other situation it may seem like a paradox. But stirred yoghurt with fruits is a category that transcends both and allows you to"have your cake and eat it too"!

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NUTRITIONAL AND FUNCTIONAL PROPERTIES OF PEA PROTEIN

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Introduction

Higher protein intake has been shown to improve muscle mass and strength, immunity,wound healing, cardiovascular health and bone strength (1, 2, 3, 4, and 5). Increased protein consumption at levels greater than the current RDA (0.8 g/day/Kg for active adults and 1.0-15 g/Kg/d for older adults)has been shown to be beneficial for adults to recover from exercise, strengthen the immune system and to maintain lean mass (6,7). There has been an increasing interest in using plant proteins recently due to the concerns about high cholesterol, allergenicity, and animal welfare and sustainability issues associated with animal proteins(8, 9).Legumes are an important source of protein in terms of quantity and quality(10).Therefore, there is a growing interest to manufacture and sellfood products made out of legumes, which are labeled as diary and animal free.Peas are rich in proteins, minerals vitamins, starches and fibers. Peas are used in a variety of foods such as soups, snacks, rice and vegetable dishes, stews, etc. (11).Pea protein isolate, which contains 80% of protein, and pea protein concentrate, which contains ~ 47% of protein, havebeendevelopeed as food ingredients (12, 13). Pea protein is increasingly considered as a substitute for soy protein due to the rare allergenic nature of pea (11). Functionality and quality of pea protein is comparable with that of soy protein (11).

Nutritional quality and digestibility of pea protein

Protein content of pea varies depending on the variety. Generally, pea contains ~25% of protein. Legumin (11S), Vicillin (7S) and Albumins (2S) are the different types of proteins present in pea (14). Amino acid composition of Legumin (11S), vicillin are similar to glycinin and β-conglycinin, the types of protein present in soy(15).Amino acid composition of soy vs. pea is given in Table 1. Pea protein has high levelsof lysine, arginine and glycine, but low in methionine and cysteine (Table 1) (11).

Table 1.Amino acid composition of soybean and pea

Essential amino acid		
Histidine	2.53	2.52
Isoleucine	4.54	4.7
Leucine	7.78	8.2
Lysine	6.38	7.1
Methionine	1.26	1.1
Phenylalanine	4.94	5.5
Threonine	3.86	3.8
Tryptophan	1.28	1.0
Valine	4.80	5.0
Non-essential amino acid		
Alanine	4.26	4.3
Arginine	7.23	8.7
Aspartic acid	11.70	11.5
Cysteine	1.33	1.0
Glutamic acid	18.70	16.7
Glycine	4.18	4.0
Proline	5.49	4.3
Serine	5.12	5.1
Tyrosine	3.14	3.8

High levels of arginine and lysine are known to support immune response, and glycine is a known source of muscular energy during stress.Pea protein (NUTRALYS®) also contains high levels of branched chain amino acids such asisoleucine, leucine, and valine, which are known to play an important role in muscle protein synthesis andperformance [16].Arginine that sustains physical effort and the efficacy of theimmune system, and glutamine are a source of energy for the muscles during stress [16].

A protein is considered high in nutritional quality as long as it can provide adequate nitrogen and amino acids needed for the proper growth of human beings. Nutritional quality of a protein is determined by the ability of the protein to meet the nitrogen and amino acid demands of an organism. Protein digestibility-corrected amino acid score (PDCAAS) calculated by using the formulas prescribed by FAO/WHO is the widely accepted and approved way of assessing protein quality. PDCAAS is defined as "the digestibility of the protein and the protein's ability to supply essential amino acids in the amounts needed to meet the requirements of growing human beings"[19,20]. The best quality protein has the highest PDCAASof1.0 or 100%.This means that a protein with PDCAAS 1.0 has the ability to provide all the essential amino acids required for the growth and functioning of a human being if taken in adequate amounts. According to a rat study conducted to assess the nutritional quality of pea protein (NUTRALYS®), the estimated PDCAAS of pea protein was 85.1 percent for children (3 to 10 years) and 92.8 percent for adults [17].

In this study, though methionine and cysteine are the limiting amino acid in pea protein, there was no major change in PDCAAS even after the addition of 0.3 percent methionine to pea protein. Digestibility of pea protein varies. Therefore, it is important to choose a pea protein with good digestibility profile. The pea protein (NUTRALYS®) used in this study was produced from yellow pea (Pisum sativum), and it had a higher digestibility than other pea protein concentrates reported in literature. Additionally, pea protein has a PDCAAS higher than other plant-based protein sources vegetables, legumes and cereals and comparable to casein, egg white, soy protein and beef (Table 2)[17]. In accordance with this, another study, which investigated the bioavailability and postprandial protein usage, demonstrated good nutritional value for pea protein [18].

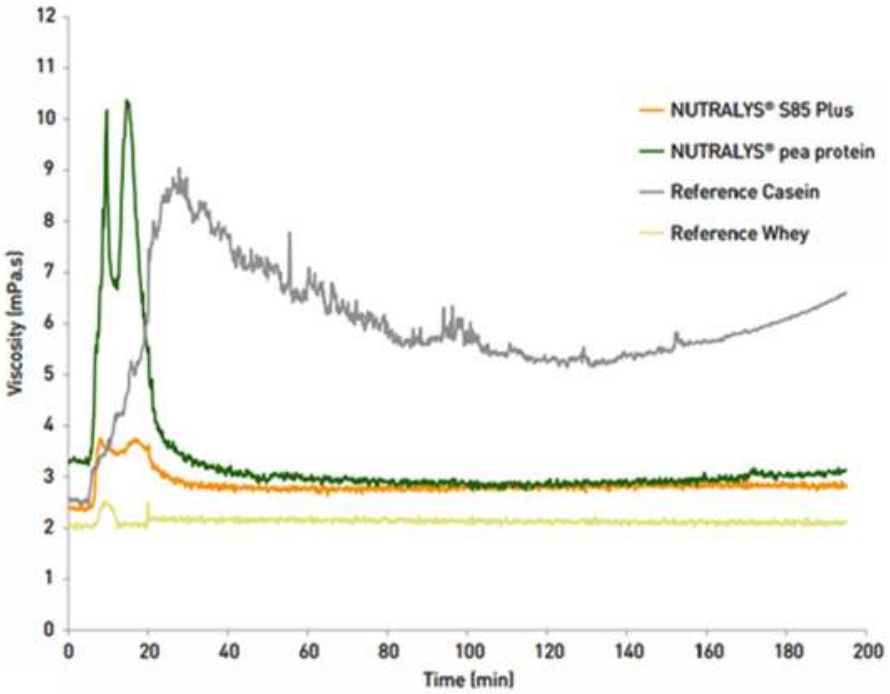
Table 2. PDCAAS score of pea protein vs. other proteins

Protein Source	PDCAAS (%)
Casein	100
Egg white	100
Soy protein	100
Pea protein	93
Beef	92
Fruits	76
Vegetables	73
Legumes	70
Cereals	59
Whole wheat	42

In in-vitro simulated gastric conditions, pea protein has been found to have an intermediate intestinal digestibility profile, which falls in between whey and casein (Figure 1) [19]. In another study, pea protein was as efficacious as whey protein in triggering gastrointestinal satiety anorexigenic hormones such as cholecystokinin (CCK), glucagon like peptide 1 (GLP-1) and peptide yy (PYY) (20). Additionally, pea protein could induce a similar response like whey protein in insulin and ghrelin levels[20].

Legume protein are known to contain anti-nutritional factors such as protease inhibitors, lecithins, tannins, saponins and phytates, which are either naturally existing or being accumulated during processing[11].

Figure 1. Digestibility profile of pea protein (NUTRALYS®)



NUTRALYS® PLANT PROTEIN FAMILY OF INGREDIENTS

With more than 40 years' experience in the research and production of plant proteins, Roquette is the pioneer in plant protein specialties for Food, Nutrition & Health markets. NUTRALYS® is not a single ingredient: It's many. Sourced from the most discerning producers in France, Europe and Canada, cultivated and stored according to the best quality protocols in the industry to ensure a safe, sustainable and advanced pea agri-chain and developed in unique plant protein production facilities - every ingredient in the NUTRALYS® range is designed to provide the sustainable nutrition consumers want, with the availability and consistent quality you need. – every product in the NUTRALYS® range is designed to provide the sustainable nutrition your consumers want, with the availability and consistent quality you need.

Yellow Pea

The nutritious, sustainable and soil-replenishing yellow pea is among the fastest-growing sources on the market – and NUTRALYS® is the widest range of pea protein ingredients available today. Thanks to a patented, water-based process, we regularly develop new plant protein ingredients adapted to a wide range of plant-based foods, placing our customers at the forefront of innovation.

Fava Bean

A variety of plant-based protein sources is key to ensure fulfillment of taste and nutritional needs. The fava bean is a rich source of proteins and fiber. Like the yellow pea, fava bean farming is sustainable and presents great agronomic advantages. Fava bean adds diversity and nutritional variety to the NUTRALYS® family – and offers you the opportunity to expand your marketing positioning.

A Sustainable Solution

- Yellow peas and fava beans are non-GMO crops
- Yellow peas and fava beans require no irrigation and no nitrogen fertilization
- Contributes to soil fertility and to better yields in crop rotations
- Clean physical process
- Raw material and manufacturing in Europe and soon Canada
- Product availability varies by region

YELLOW PEA

FAVA BEAN

Product Information

Regulatory Status / Key Facts:

- Not a major allergen*
- Non-GMO
- Gluten-free

Kosher certification in progress for T70S in the Americas.

* Pea and fava bean are not listed in the Codex Stan 1-1985 (Rev. 1-1991)-§4.2.1.43, list of allergens to be labeled. Due to a few rare reported allergic reactions with pea (and their derived products), we strongly suggest to our customers to list the botanical origin of their pea derived products in their ingredient statement. This informative and technical document is provided for Food Business Operators or Health Care professionals, including prospective customers for Roquette and not intended to be delivered as such to final consumers. Legal, regulatory, policies and requirements are subject to change and jurisdictional variation.

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Thanks to their high expertise and state-of-the-art technologies and equipment, our multidisciplinary teams work on a large range of food applications including specialized nutrition, baking, confectionery, dairy, savory, and beverages.

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Anti-nutritional factors are known to vary depending on pea variety. These factors are known to affect digestibility and amino acid bioavailability. Several post-harvest processing methods such as dehulling, soaking, heating and irradiation have been known to remove or inactivate anti-nutritional factors [11, 16, and 17]. Other methods such as ultrafiltration without solvents, extrusion, cooking and baking are also known to be helpful in inactivating these anti-nutritional factors [11, 16, and 17].

Pea protein has been found to be safe in acute and chronic toxicity, genotoxicity and mutagenicity studies conducted by Chentouf et al., 2013b, 2013c, 2013d. Using internationally validated methods and in accordance with OECD Guidelines (www.oecd.org/chemicalsafety/testing/oecdguidelinesforthetesting of chemicals.htm) [21, 22, 23, 24]

Prevalence of allergy to pea is rare unlike wheat, whey or soy [25].There are some clinical data on sensitization to peas, pea globulins (vicilin and a`) and pea albumins with mild symptoms [25].Only one study has reported severe anaphylaxis with pea consumption [26]. As per the criteria set by IUIS Allergen Nomenclature Sub-Committee (Allergen Nomenclature 2017), only vicilin and convicilin have been reported as allergens named Pis s 1 and Pis s 2, respectively [27].

Scientific evidence for various health benefits of pea protein

A number of health benefits such as reduction in caloric intake, improvement in satiety, increase in muscle mass and physical activity, weight management, lowering hypertension and reduction in cholesterol levels have been demonstrated with pea protein supplementation by pre-clinical and clinical studies.

A positive effect on postprandial glycemic response has been demonstrated following yellow pea protein supplementation at a dose of 10-20 gm in young and healthy males [28]. However, no effect on postprandial glycemic response following the supplementation of yellow pea protein was observed in another study [29].

Blood cholesterol levels have long been considered as a risk factor for heart disease. In a preclinical study, a diet containing pea protein had a positive effect on lowering total cholesterol and low-density lipoprotein+ very low-density lipoprotein (LDL + VLDL) in rats fed with hypercholesterolemic diet for 28 days [30]. In a randomized, double-blind, parallel group study, pea protein combined with apple pectin supplementation produced a significant reduction in total cholesterol levels. Pea protein and pea protein isolate have been reported to have blood pressure lowering effect in pre-clinical studies [31]. In a randomized short-term study, pea protein supplementation resulted in a positive impact on blood pressure related outcomes in 48 (six groups) overweight or obese adults [32].

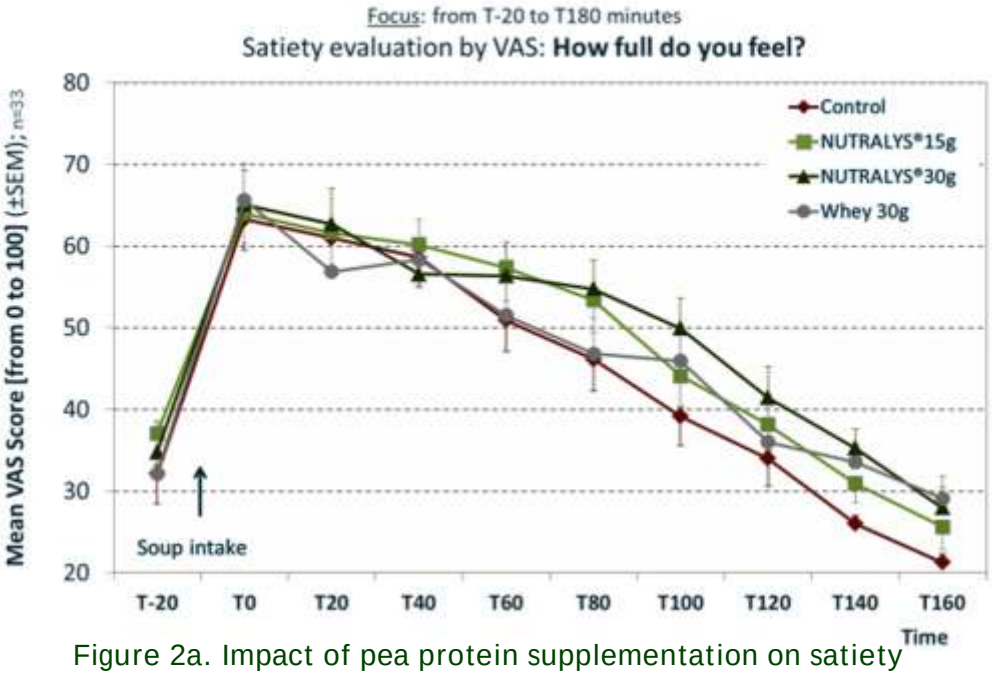
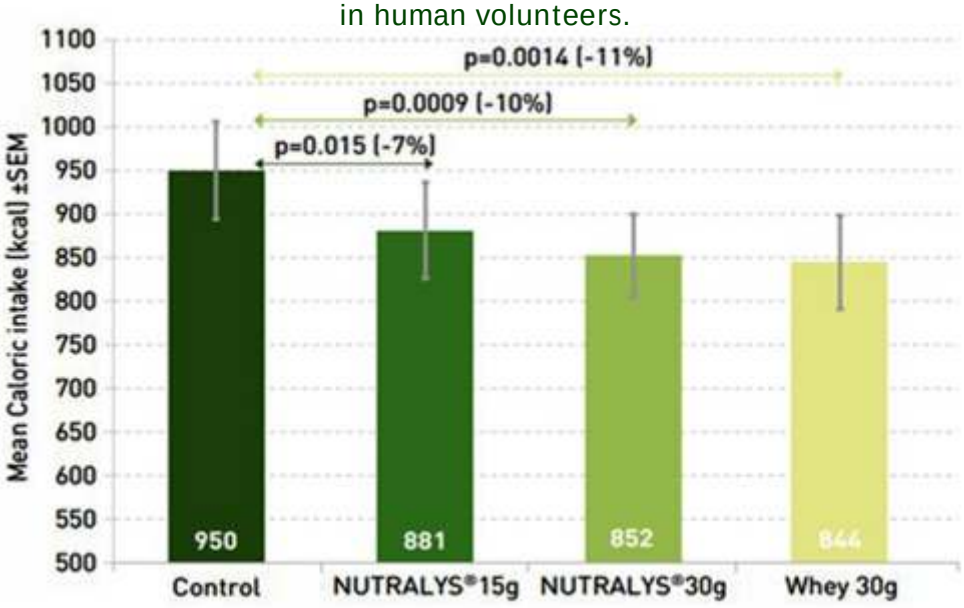


Figure 2a. Impact of pea protein supplementation on satiety in human volunteers.

Figure 2b. Impact of pea protein supplementation on satiety in human volunteers.



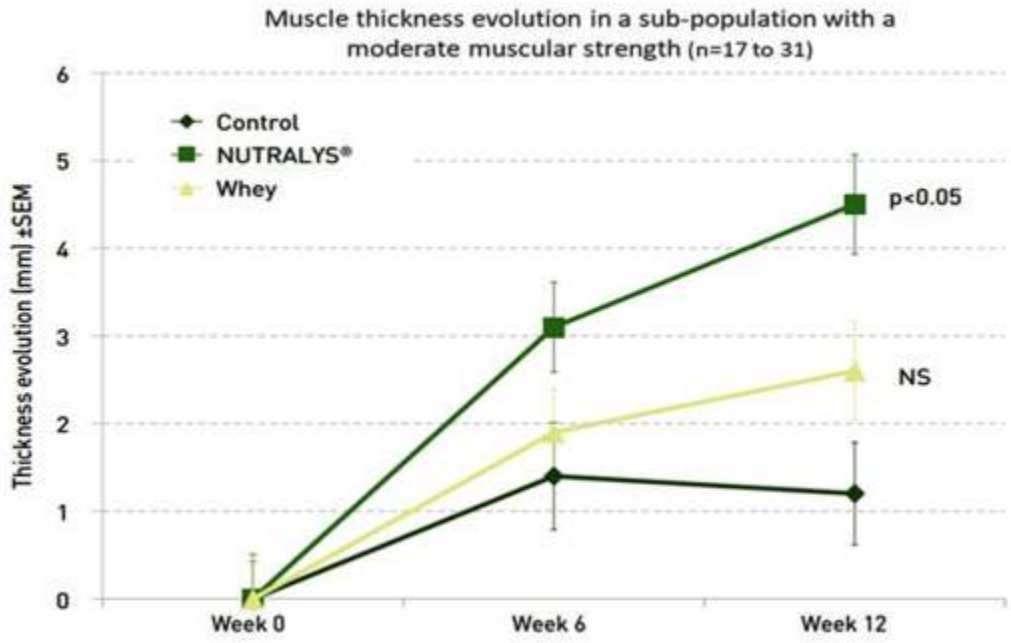


Figure 3. Effect of pea protein (NUTRALYS®) supplementation on muscle mass in a population presenting moderate muscle strength and participating in physical training.

In a cross-over clinical study (Re et al. 2016) short-term satiating effects of two doses (30 and 15 g) of a plant-based pea protein (NUTRALYS®) in comparison to whey protein (30 g) using a preload soup were examined in 33 human volunteers. Results showed that the pea protein and the whey protein reduced caloric intake (Figure 2a) and increased the feeling of fullness (how hungry a person feels) (Figure 2b) equally at the ad libitummeal [33].

Pea proteins are rich in branched-chain amino acids, and therefore are known to help in muscle synthesis. Oral supplementation of pea protein NUTRALYS® (25 g) have been demonstrated to produce a similar effect like whey protein in increasing muscle mass thickness compared to placebo in males aged 18-35 years (Figure 3)(34).

Functional properties of pea protein

The global food industry has started exploring various types of plant proteins. Pea protein as one of them is used as a functional ingredient in many formulations. Proteins play an important role in food industry. Other than providing nutrition, proteins also possess specific functional properties that aids processing and defines product performance. The behavior of proteins in foods is largely dependent on its functional and physicochemical properties. Different techno-functional properties and their mode of action in different food systems is shown in Table 1.

Functional properties are dependent on a number of parameters mainly classified into extrinsic and intrinsic factors. Extrinsic factors comprises temperature, ionic strength, method of extraction, pH, etc. whereas intrinsic factors comprises the amino acid composition, size, shape, etc. [35].

Table 1: Techno-functional role of functional proteins in food systems

Techno-functional property	Mode of action	Food system
Solubility	Protein solvation	Beverages
Water absorption and binding	Hydrogen bonding of water; Entrapment of water (no drip)	Meat, sausages Breads, cakes
Viscosity	Thickening; water binding	Soups, gravies
Gelation	Protein matrix formation and setting	Meats, curds, cheese
Cohesion-adhesion	Protein act as adhesive material	Meats, sausages, baked goods, pasta
Elasticity	Hydrophobic binding in gluten; Disulfide links in gels	Meats, bakery
Emulsification	Formation and stabilization of fat emulsions	Sausages, bologna, soups, cakes
Fat absorption	Binding of free fat	Meats, sausages, doughnuts
Flavor-binding	Adsorption, entrapment, release	Simulated meats, bakery etc.
Foaming	Form stable film to entrap gas	Whipped toppings, chiffon desserts, angel cakes

Various physical and chemical properties such as hydration, surface and rheological characteristics are dependent on the processing conditions as well as the composition and structure of pea protein. Pea protein because of its nutritional value, health benefits and availability can be used as an effective alternative for soybean and animal proteins in food applications (36).

Emulsifying properties
Various studies have shown that pea protein possesses good emulsifying properties because of their surface-active molecules that are amphiphilic. This property helps in the homogenization of two immiscible liquids (11, 16).

Solubility
Pea protein is preferred in beverage application because of its high solubility and low viscosity characteristics. Pea protein has a finer particle size with good solubility, which is suitable for wet applications such as plant-based beverages or clinical nutrition products. It is used for special nutrition applications such as sports nutrition, weight management and senior nutrition.

Water-binding capacity
A water-binding property is required especially in meat or mock meat products.

A study was conducted in 2011 in the Danish Meat Research Institute (DMRI) to study the functional properties of pea protein. To quantify expelled liquid purge after three weeks of storage, vacuum packages containing 10 slices of meat products made with pea protein as an ingredient were used for the study. The results showed more than 70% decrease in cooking loss by improving the retention of water during cooking (16).

Meat alternatives
Due to the environmental issues and increasing health concerns, vegetarian foods occupy a larger shelf space in today's market, which is seen by the increase in demand for meat analogues.
Texturized pea proteins are protein-based meat analogues that can extend the shelf life of meat products while being functional, economical and at the same time a protein-richfood ingredient (65% protein approximately).Texturized pea proteins can imitate the fibrous texture, appearance and bite of meat due to its rehydration and texturizing properties and hence are used in applications like mock meatballs, patties and pie fillings. Since pea is not a major allergen, its use gives manufacturers the opportunity to reduce the number of allergens that have to be listed on packaging (16).

Dairy alternatives
Pea protein shows good technical functionalities that are necessary to develop dairy-alternative products. Some of its functionalities are emulsion-forming properties where pea protein helps to emulsify and stabilize the product and texturizing properties where the protein helps in forming a gel and giving a desired texture. Spray dried pea protein grades have free-flowing properties that help to avoid use of flow agents (16).

Pea protein in baking
Protein fortification
Pea proteins are used to increase the protein content of the baked goods since increasing the level of gluten hinders the rheology of the dough. It helps to achieve high protein content with a balanced amino acid score along with preserving texture. A challenge is to achieve high protein content with a balanced amino acid score while maintaining the texture and the cost effectiveness of the product. Studies have shown that development of baked goods with a balanced amino acid profile is possible with a mix of 75:25 pea protein isolate and wheat protein, in line with the FAO recommendations (16).

Gluten-free solutions
A mix of starches and hydrocolloids such as gums are widely used to replace gluten, which leads to weak crust formation and rapid staling due to quick retrogradation. To overcome this challenge, a functional grade of pea protein has been developed that increases the Maillard reaction thus helping in creating a stronger crust and to delay staling. Since pea protein has an almost complete amino acid profile, it provides high quality protein to gluten-free products that lack nutrition (16).

Conclusion
There has been a growing interest in plant-based proteins in the specialized nutrition market in recent years. Manufacturers and consumers considered plant proteins as an incomplete and low quality protein when it was introduced to the market for the first time. Soy protein was the first plant protein, which was used in the specialized nutrition market due to its high quality.
However, due to the increasing concerns regarding its allerginicity and phytoestrogen content, pea protein has been considered for specialized nutrition. Pea protein is the preferred protein for specialized nutrition industry due to its high content of branched-chain amino acids and arginine and its fit into the clean label (11, 16).

Effectiveness of pea protein in sports nutrition and weight management have been well established. Protein consumption has been demonstrated to improve muscle strength, muscle mass, immunity, would healing, blood pressure and bone strength. In addition, vegetarian diets have been known to offer a number of health benefits such as lower body fat percentage, low blood pressure and lower LDL cholesterol and lower cancer rates. Health benefits of pea protein in senior nutrition is an area of interest that is being explored currently. Most of the nutritional products, which target seniors, are dairy based. However, there is an increasing interest in plant-based protein for senior nutrition. Therefore, senior nutrition products with plant-based proteins maybe available in the market during the coming years.

Pea protein is increasingly recognized as an alternative to soy and wheat protein. In addition, pea protein fits into clean label demand and is definitely a more economical alternative to animal protein. Pea protein has sustainability advantages such as reduction in global warming as it reduces greenhouse gas emissions compared to livestock. Further, pea protein may contribute to eutrophication, acidification, land use, etc. [36, 37]. Land requirements for production of animal meat proteins are 10 times greater than for plant-based proteins. Industrial agriculture produces large amounts of animal manure, which causes pollution of drinking water and vegetables. Finally, animal production requires significant energy amounts and contributes to deforestation, overgrazing and overfishing [36, 38].Clearly, pea protein is a high quality and highly sustainable protein source, which may be incorporated into the diet for increasing dietary protein intake and for deriving various health benefits.

Pea protein has a good powder dispersibility in cold water and provides smooth texture to finished products. It reduces the grittiness in products such as powdered drinks, soups, shakes, ready-to-drink beverages and protein bars. Textured pea protein exhibits very good fibrous texture, firmness and taste profile and therefore is ideal for plant-based foods such as meat substitutes [11, 16].

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(and more- please contact author for more details)

PROBIOTICS IN BUILDING IMMUNITY AND REDUCING THE RISK OF INFECTIONS

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It is well known that the immune system is an important determinant of human health. It maintains homeostasis and initiates an appropriate response on exposure to a harmful pathogen, foreign substance or tissue injury. It is also well established that about 70% of the body's immune system is located in the intestine which makes it the largest immune organ of the human body.

The immune system relies on the 100 trillion microbes (intestinal microbes) that are an integral part of the intestine for its induction, training and function. The balance of the microbes is crucial for a well-regulated immune response that helps in preserving health and preventing diseases.

All probiotics induce an immune response, and probiotics increase immunoglobulin A (IgA)-secreting cells in respiratory and gastrointestinal mucosae[6]. Several studies have shown that probiotics including Lactobacillus casei Shirota have been able to provide protection against infection including those of upper respiratory tract. Studies have also been conducted with athletes and sports persons whose immune system is compromised in vigorous physical activity. Protection is provided by probiotics in these cases as well as will be seen below.

Manipulating the microbes by consumption of a probiotic has gained importance for increasing the beneficial components of the intestinal microbes and therefore ensuring a strong and well-functioning immune system.

Lactobacillus casei strain Shirota – Immunomodulatory Mechanism

Studies of over two decades have revealed that the specific cell wall of the probiotic bacteria, Lactobacillus casei strain Shirota (LcS) is composed of a Polysaccharide-Peptiglycan (PS-PG) complex which has an important role in its immune modulating activity.

The PS-PG complex of the cell wall activates macrophages to induce production of the cytokine interleukin-12 which activates T cells to secrete Interferon-gamma (IFN –γ). This in turn is capable of augmenting Natural Killer (NK) cell activity. NK cells play a critical role in immune surveillance against tumour development and viral infections[1].

Several studies have also shown that LcS can help to increase and maintain Secretory immunoglobulin A (SIgA) levels in the saliva. Salivary IgA is considered as the "first line of defence" against mucosal pathogens and there is consensus that reduced Salivary IgA levels are associated with the increased risk of developing infections.

LcS can augment host immune defence against infections by modulating Th1 response and can downregulate excessive immune response by maintaining the balance of Th1/Th2 immune response of downregulating the production of the pro inflammatory IL-6[1].

Scientific Studies

1. Benefit of LcS for athletes who have a transient depression of the immune system and increased susceptibility to infection

Prolonged intense exercise has been

associated with a transient depression of immune function and heavy training can lead to immune impairment in athletes who then become susceptible to upper respiratory tract infections[2]. The mechanisms responsible for such effects are presumed to be the activation of the inflammatory response by mucosal dryness and greater exposure to pollutants in the upper airways.

It has been shown in athletes that daily intake of probiotics LcS reduces the incidence of infections among them[2].

A recent study by Vaisberg et al. has found that L. casei Shirota, besides modulating the immune response in the airways, may also regulate the systemic response post-marathon[3].

A randomised placebo-controlled trial was conducted on 42 male amateur marathon runners in Sao Paolo city who consumed either 40 x 109L. casei Shirota (n-22) 30 days prior to the marathon. Various immune parameters were measured in the nasal mucosa and serum and concentrations of Secretory IgA and antimicrobial peptides were tested in the saliva.

IL-10 levels were higher in the L. casei Shirota group as compared to the placebo group. An increase in IL-10 may be protective against mucosal inflammation and upper respiratory tract infections. Furthermore, the IL-10/IL-12 ratio in the nasal mucosa was higher in the L. casei Shirota group as compared to the placebo group after the marathon suggesting a balance between the anti-inflammatory and pro-inflammatory state[3].

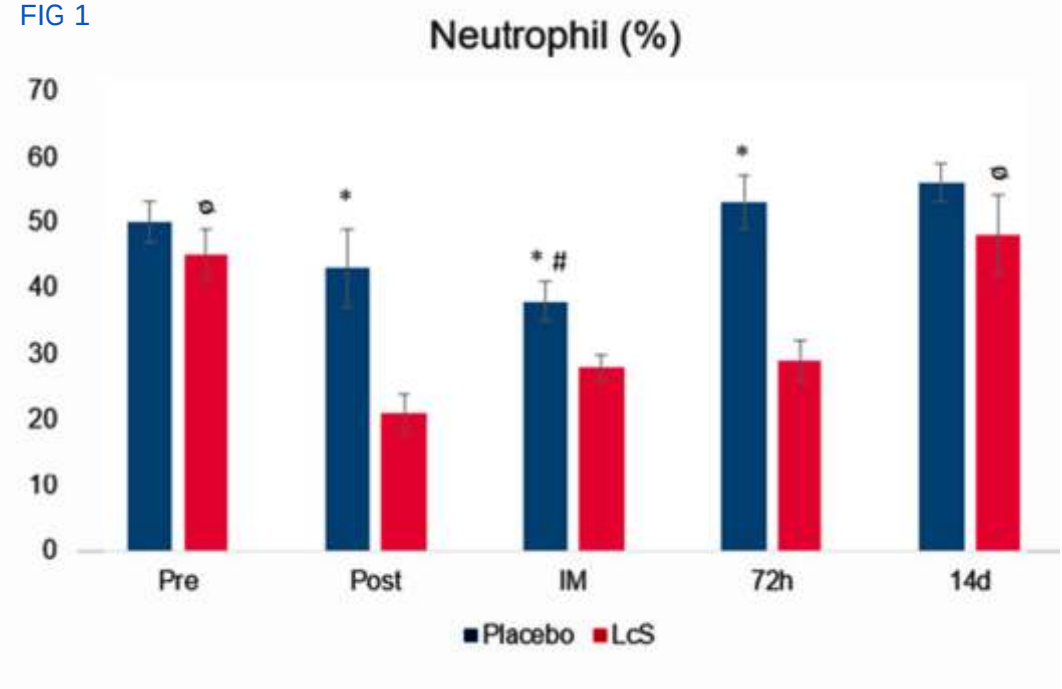
Salivary IgA levels were maintained in the L. casei Shirota group which may be key in the inhibitory effect of the probiotic against pathogenic bacteria, as suggested by the authors.

These finding indicate an inflammatory effect on the mucosa and the systemic immune response in marathon runners and the ability of LcS in effectively countering these changes.

International Society of Sports Nutrition has recently published a position stand on Probiotics and stated that different strains/species including L. casei Shirota (LcS) have been shown to improve immune health in athletes, reducing the episodes, severity or duration of exercise-induced infections8.

2. Improved immunity and lower risk of infections in the elderly Immuno-senescence, commonly observed even with healthy ageing is a decline in immune function leading to an increased risk of infections and cancer. It has been reported the activity of NK cells which are critical for the removal of intracellular pathogens and also possess vital tumoricidal activities declines with ageing[4].

FIG 1

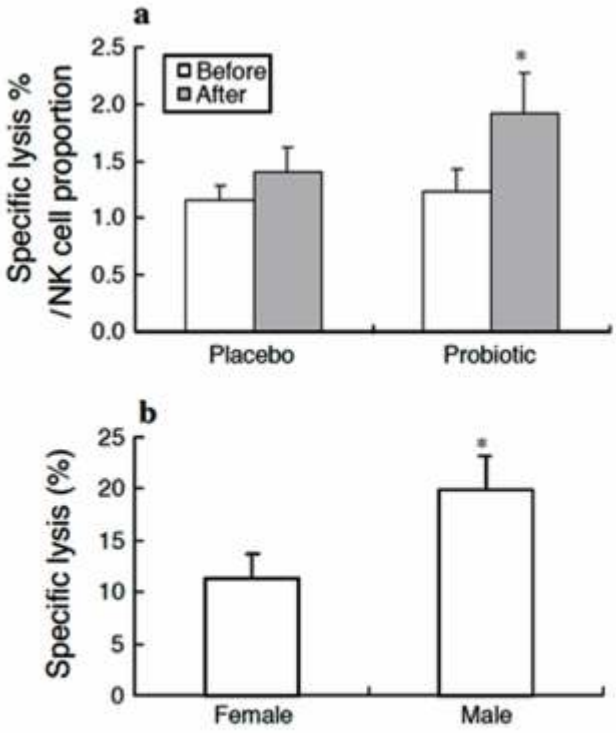


A randomised, placebo-controlled, single-blind crossover study was conducted on thirty healthy old volunteers in the age-group of 55-74 years who consumed the probiotic drink containing 13 X 109 CFU LcS or skimmed milk per day for 4 weeks, followed by 4 weeks of washout and were crossed over to the other treatment group. Peripheral blood and saliva samples were collected at baseline and end of each treatment.

Probiotic consumption was associated with a significant increase in Natural Killer (NK) cell activity relative to baseline and a significant decrease in the mean fluorescence activity of CD25 expression in the resting T cells compared with placebo[5].

There was a trend towards an increased ratio of IL-10 to IL 12 relative to baseline after LcS intake which indicates a shift towards a more anti-inflammatory profile. This could be beneficial for other people, given the increase in circulating inflammatory mediators with ageing[5].

FIG 2



Effect of probiotic LcS consumption on NK cell activity. Data are mean ± SE. Specific lysis (%) before and after probiotic (LcS) or placebo supplement.

The authors concluded that consumption of a probiotic drink containing LcS improved NK cell activity and tended to produce a more anti-inflammatory cytokine profile in an older population.

In another study with elderly population, daily intake of fermented milk containing LcS decreased duration of acute upper respiratory tract infections in day care facilities[7].

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REGULATORY ROUND UP

By
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Dear Readers

Hope you and your family are safe. Please find below FSSAI notifications since the last round up. Make sure you have a good look at the date of implementation. This round up has also draft notification. Readers can submit their comments on line. One needs to register for commenting through e comments platform.

Final Gazette Notification

Latest compendium of Food Safety and Standards (Food Products Standards and Food Additives) Regulation, 2011 has been published.

Final notification amending Heavy metals and microbial toxins in different foods and food categories. Limits for heavy metals in food additives have been introduced. New standards for Total Aflatoxin, Afla Toxin B1 in different food categories have been stipulated. Limit for Afla Toxin M1, which was set only for milk, has now been extended to milk powders.

Final notification amending the standards of Rice, Almond Kernels, Mixed Masala and introducing new ones for Chia seeds, Ragi flour, Coconut Milk powder, spice oleoresins, etc. Readers are advised to go through the entire regulation as it contains wide range of food categories.

Final notification setting standards for wheat bran, soy milk and soy milk based beverages, Tofu, Soy curd, etc

Final notification on the standards for meat and meat products like restructured, smoked, pickled, etc

Final notification introducing standards for frozen beans, spinach, cauliflower and peas.

Final notification regarding amendment in microbiological standards and in the role of Regulator and FBO with respect to finished good clearance to the market.

FSSAI has released the final notification on the modes of declaration of artificial sweeteners in case of products which are sold through vending machines. In such cases, the FBO will make all the mandatory declarations with regard to artificial sweeteners both prominently on the vending machines and also on the cup that is used for serving. This is not applicable to vending machines which serve pre-packaged foods and beverages.

Draft Gazette Notifications

Draft notification setting standards for shea butter.

Draft notification defining milk analogues and milk analogue containing products. Such products shall carry a declaration "This is not a Dairy Product". Milk and milk products are permitted to use a logo indicating that the product has milk ingredients. The regulation also revises the standard for Ghee, Anhydrous Milk Fat. Location wise specific RM and P requirements have been done away with.

Draft notification permitting the incidental presence of Kesri dhal in pulses as part of other grains. The "other grains" shall not exceed 2 %.

Advisories and Orders

FBOs with import and manufacturing license are permitted to submit their Form D, for the year 2019 –20, till 31 December 2020.

FSSAI revalidates the license of bio diesel manufacturers who are authorized to collect used cooking oil for one more year.

FSSAI Central Authority has directed the State machinery to strictly monitor and ensure compliance with applicable labelling provisions in case of products falling under Health Supplement, Nutraceutical regulation.

FSSAI has formulated a Standard Operating Procedure for the refund of registration or licensing fees (more than Rs 100) within one year of payment.

FSSAI re-operationalizes the regulation which defined and listed E commerce FBOs and modified the Schedule IV relating to GMP requirements. This process of operationalization has been going on for a few years now and has not been Gazette notified for reasons not very clear to the stakeholders. However, this operationalized document is not included in the compendium of Food Safety and Standards (Licensing and Registration) Regulation, 2011.

State Food Commissioners and Licensing authorities are requested to carry out strict surveillance of vegetable oil manufacturing and blending units to ensure edible vegetable oil is not adulterated with DiacylGlycols(DAG), glycerine and synthetic oil. The same order also directs the officers to check the presence of oryzanol in mustard oil as a marker of adulteration with rice bran oil. The onus of explaining the purpose of the presence of these substances at the site is on the manufacturers.

WEBINAR REPORT
PLAGIARISM AND CONFLICT OF INTEREST

Protein Foods & Nutrition Development Association of India (PFNDAI) recently organized a webinar on "Plagiarism and Conflict of Interest", where the main objective was to help our audience understand what plagiarism is, the existing laws on plagiarism in India and how research students & professionals can avoid plagiarizing. It also aimed at making the individuals aware of the situations where conflict of Interest can arise; and how can one deal with it. The webinar was held on 20 July 2020.

For the webinar, we had speakers- Dr Sesikeran B. (Former Director at NIN, Hyderabad and Chairman- Scientific Advisory Committee at PFNDAI) and Dr Shatadru Sengupta (Senior Director at Legal- Hardcastle Restaurants Pvt. Ltd. and Vice Chairman at PFNDAI), along with Dr Joseph Lewis (Regulatory Consultant and Vice Chairman- Regulatory Affairs Committee at PFNDAI) as the moderator.

The webinar was attended by a large number of people. The attendees included professionals working in food industries and regulatory bodies, professors, research scholars, students, dietitians and scientists.

Dr Jagadish Pai (Executive Director at PFNDAI) welcomed everyone and gave a brief introduction of PFNDAI. Ms Swechha Soni (Manager Food & Nutrition at PFNDAI) introduced speakers and

AUTHOR
Seles Gupta,
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Lewis in his remarks gave the importance of the seminar topic.

Dr. Shatadru in his presentation on Plagiarism & Conflict of Interest had put up the various definitions of the word 'plagiarism' and the common thread across all the definitions found was "lack of citation, credit of attribution to the creator, researcher or innovator".

He mentioned few of the main reasons among all the different reasons for why plagiarize, one being that a lot of people are not skilled in research, are sometimes too lazy to put in the work and they see copying someone's work as an easy way out. He talked on the legal perspective explaining the consequences on allegations of plagiarism.

The second part of his presentation talked about "Conflict of Interest" which is a situation that benefits a person/ organization but negatively affects another person/ organization. For example, when an institute/organization allows you to carry the research only if you promise that your study will provide the results they want.

The audience had some questions that were addressed in brief details by Dr. Shatadru for their clarification.

Dr. Sesikeran in his presentation on Plagiarism talked about plagiarism giving more of a practical perspective and explained about the different forms of plagiarism. Plagiarism is defined as presenting someone else's work or ideas as your own, with or without their consent.

As plagiarism maybe sometime intentional while sometime not, many people may get accused of it including some famous people. He also gave some recent examples of a plagiarism case. He also mentioned about different levels of and types of plagiarism and explained those briefly giving relevant examples.

To avoid plagiarism he suggested that the original work must be correctly acknowledged for which he suggested certain points that were important to consider. One call also check the amount of content that could be considered as plagiarized in one's work for which he suggested certain Plagiarism Checking Websites.

A short Q & A was followed after his talk addressing some of the queries raised by the audience. A brief panel discussion was lead by Dr Lewis to sum up the session.

The webinar ended with a vote of thanks by Ms Swechha.

RESEARCH IN HEALTH & NUTRITION

'Fat burning' molecule has implications for treatment of obesity

June 8, 2020 Science Daily

"Obesity is the biggest health problem in the United States. But, it is hard for people to lose weight and keep it off; being on a diet can be so difficult. So, a pharmacological approach, or a drug, could help out and would be beneficial for all of society," said Webster Santos, professor of chemistry and the Cliff and Agnes Lilly Faculty Fellow of Drug Discovery in the College of Science at Virginia Tech.

Santos and his colleagues have recently identified a small mitochondrial uncoupler, named BAM15 that decreases the body fat mass of mice without affecting food intake and muscle mass or increasing body temperature. Additionally, the molecule decreases insulin resistance and has beneficial effects on oxidative stress and inflammation. The findings, published in Nature Communications on May 14, 2020, hold promise for future treatment and prevention of obesity, diabetes, and especially nonalcoholic steatohepatitis (NASH), a type of fatty liver disease that is characterized by inflammation and fat accumulation in the liver. In the next few years, the condition is expected to become the leading cause of liver transplants in the United States.

The mitochondria are commonly referred to as the powerhouses of the cell. The organelle generates ATP, a molecule that serves as the energy currency of the cell, which powers body movement and other biological processes that help our body to function properly. In order to make ATP, nutrients need to be burned and a proton motive force (PMF) needs to be established within the mitochondria. The PMF is generated from a proton gradient, where there is a higher concentration of protons outside of the inner membrane and a lower concentration of protons in the matrix, or the space within the inner membrane. The cell creates ATP whenever protons pass through an enzyme called ATP synthase, which is embedded in the membrane. Hence, nutrient oxidation, or nutrient burning, is coupled to ATP synthesis.

"So anything that decreases the PMF has the potential to increase respiration. Mitochondrial uncouplers are small molecules that go to the mitochondria to help the cells respire more. Effectively, they change metabolism in the cell so that we burn more calories without doing any exercise," said Santos, an affiliated member of the Fralin Life Sciences Institute and the Virginia Tech Center for Drug Discovery. Mitochondrial uncouplers transport protons into the matrix by bypassing ATP synthase, which throws off the PMF. To reestablish the gradient, protons must be exported out of the mitochondrial matrix. As a result, the cell begins to burn fuel at higher than necessary levels.

Knowing that these molecules can change a cell's metabolism, researchers wanted to be sure that the drug was reaching its desired targets and that it was, above all, safe. Through a series of mouse studies, the researchers found that BAM15 is neither toxic even at high doses nor does it affect the satiety center in the brain, which tells our body if we are hungry or full. In the past, many anti-fat drugs would tell your body to stop eating. But as a result, patients would rebound and eat more. In the BAM15 mouse studies, animals ate the same amount as the control group -- and they still lost fat mass. Another side effect of previous mitochondrial uncouplers was increased body temperature. Using a rectal probe, researchers measured the body temperature of mice that were fed BAM15. They found no change in body temperature.

But one issue arises concerning the half-life of BAM15. The half-life, or the length of time that a drug is still effective, is relatively short in the mouse model. For oral dosing in humans, the optimal half-life is much longer. Even as BAM15 has some serious potential in mouse models, the drug won't necessarily be successful in humans -- at least not this same exact molecule. "We are essentially looking for roughly the same type of molecule, but it needs to stay in the body for longer to have an effect. We are tweaking the chemical structure of the compound. So far, we have made

made several hundred molecules related to this," said Santos. The penultimate goal of the Santos lab is to transition the anti-fat treatment from animal models to a treatment for NASH in humans. The lab has used their better compounds in animal models of NASH, which have been proven to be effective as anti-NASH compounds in mice. Working alongside Santos is Kyle Hoehn, an assistant professor of pharmacology from the University of Virginia and an associate professor of biotechnology and biomolecular sciences at the University of New South Wales in Australia. Hoehn is a metabolic physiology expert who is in charge of conducting the animal studies. Santos and Hoehn have been collaborating for several years now and they even founded a biotech company together.

Co-founded by Santos and Hoehn in 2017, Continuum Biosciences aims to improve the ways in which our bodies burn fuel and fight back against our bodies ability to store excess nutrients as we age. These promising NASH treatment compounds are licensed by their company and are patented by Virginia Tech. The company is looking to use mitochondrial uncouplers for more than just obesity and NASH. The molecules also have a unique anti-oxygen effect that can minimize the accumulation of reactive oxygen species, or oxidative stress, in our bodies, which ultimately results in neurodegeneration and aging. "If you just minimize aging, you could minimize the risk of Alzheimer's disease and Parkinson's disease. All of these reactive oxygen species-related or inflammation-related diseases could benefit from mitochondrial uncouplers. So, we could see this heading that way," said Santos.

Essential components of dietary restriction revealed

June 9, 2020
Science Daily

Studies by Monash Biomedicine Discovery Institute (BDI), have provided a new understanding into the roles two essential amino acids play in metabolic health, which may help scientists in the fight against obesity.

Led by Dr Adam Rose , the recent finding, published in Nature Communications, shows that by reducing the amount of two amino acids -- threonine and tryptophan -- in young healthy mice, they were able to burn more calories than they consumed, without calorie reduction, keeping them lean and healthy and without the side-effect of lower muscle mass. A low-threonine diet even protected mice that were morbidly obese and prone to developing type 2 diabetes.

While a moderate reduction in dietary protein and therefore essential amino acids can enhance vitality, diets devoid of this component can make people sick very quickly and are not recommended. However, this study has shown that a reconsideration of the functions of these two amino acids in nutrition warrants further exploration. "Once we understand which particular dietary components are needed for the health-promoting effects of these diets we can design strategies to mimic them, simulating the effects without having the negative side effects," Dr Rose said.

A highlight of the study was an experiment where Dr. Rose and his team genetically manipulated the mice to be able to synthesise the essential amino acid threonine, which blocked the health promoting effects of the low threonine diet and saw the mice gain weight, proving that these two amino acids can hold the key to a new diet approach.

Dr Matthew Piper, a key co-author adds, "We are finding an increasing number of situations in which essential amino acids are powerful modulators of lifelong health and lifespan. Our findings on their specific effects give us exciting insights into how we might harness their benefits to drive better health." Co-author Professor Stephen Simpson of the University of Sydney's Charles Perkins Centre said, "We are beginning to understand how critical the balance of dietary amino acids is to the control of appetite, health and ageing." Part of the project was funded by a Monash University Science/Medicine interdisciplinary research fund.

Transgenic rice lowers blood pressure of hypertensive rats

June 24, 2020 Science Daily

In the future, taking your blood pressure medication could be as simple as eating a spoonful of rice. This "treatment" could also have fewer side effects than current blood pressure medicines.

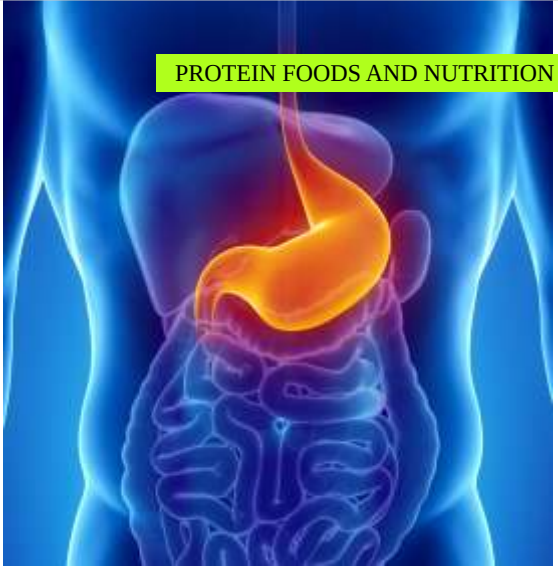
As a first step, researchers reporting in ACS' Journal of Agricultural and Food Chemistry have made transgenic rice that contains several anti-hypertensive peptides. When given to hypertensive rats, the rice lowered their blood pressure.

High blood pressure, also known as hypertension, is a major risk factor for cardiovascular disease and stroke. A common class of synthetic drugs used to treat hypertension, called ACE inhibitors, targets the angiotensin converting enzyme (ACE), which is involved in blood pressure regulation. However, ACE inhibitors often have unpleasant side effects, such as dry cough, headache, skin rashes and kidney impairment.

In contrast, natural ACE inhibitors found in some foods, including milk, eggs, fish, meat and plants, might have fewer side effects. But purifying large amounts of these ACE-inhibitory peptides from foods is expensive and time-consuming. Le Qing Qu and colleagues wanted to genetically modify rice -- one of the world's most commonly eaten foods -- to produce a mixture of ACE-inhibitory peptides from other food sources.

The researchers introduced a gene to rice plants that consisted of nine ACE-inhibitory peptides and a blood-vessel-relaxing peptide linked together, and confirmed that the plants made high levels of the peptides. The researchers then extracted total protein (including the peptides) from the transgenic rice and administered them to rats. Two hours after treatment, hypertensive rats showed a reduction in blood pressure, while rats treated with wild-type rice proteins did not. Treatment of rats over a 5-week period with flour from the transgenic rice also reduced blood pressure, and this effect remained 1 week later. The treated rats had no obvious side effects in terms of growth, development or blood biochemistry.

If these peptides have the same effects in humans, a 150-pound adult would need to eat only about half a tablespoon of the special rice daily to prevent and treat hypertension, the researchers say.



The gut shields the liver from fructose-induced damage

June 29, 2020 Science Daily

After one consumes food or a beverage containing fructose, the gastrointestinal system, or gut, helps to shield the liver from damage by breaking down the sugar before it reaches the liver, according to a new multi-center study led by researchers in the Perelman School of Medicine at the University of Pennsylvania.

However, the consumption of too much fructose -- particularly in a short period of time -- can overwhelm the gut, causing fructose to "spill over" into the liver, where it wreaks havoc and causes fatty liver, researchers discovered. The findings, in mice, help to unravel longstanding questions about how the body metabolizes fructose -- a form of sugar often found in fruits, vegetables, and honey, as well as most processed foods in the form of high fructose corn syrup. Consumption of fructose has increased 100-fold over the last century, even as studies have shown that excessive consumption, particularly sweet drinks, are linked to non-alcoholic fatty liver disease, obesity and diabetes. The findings were published in Nature Metabolism.

"What we discovered and show here is that, after you eat or drink fructose, the gut actually consumes the fructose first -- helping to protect the liver from fructose-induced damage," said the study's corresponding author Zoltan Arany, MD, PhD, a professor of Cardiovascular Medicine at Penn. "Importantly, we also show that consuming the food or beverage slowly over a long meal, rather than in one gulp, can mitigate the adverse consequences."

Studies have shown that the excessive consumption of fructose can be toxic to the liver. When large quantities of fructose reach the liver, the liver uses excess fructose to create fat, a process called lipogenesis. Eventually, people who consume too much fructose can develop nonalcoholic fatty liver disease, a condition in which too much fat is stored in the liver cells.

Until now, it hasn't been clear whether the gut's role in processing the fructose prevents or contributes to fructose-induced lipogenesis and the development of liver diseases. For this study, the team of researchers, including Princeton University's Joshua Rabinowitz, MD, PhD, studied a key enzyme, called ketohexokinase, that controls how fast fructose is consumed.

They showed, by genetically engineering mice, that lowering the levels of this enzyme in the gut led to fatty livers in the mice. Conversely, the team showed that increasing the level of ketohexokinase in the gut protected from fatty liver. Thus, the researchers found the breakdown of fructose in the gut mitigates the development of extra fat in liver cells in mice. They discovered that the rate at which the intestine can clear fructose determines the rate at which fructose can be safely ingested.

In addition, the team showed the same amount of fructose is more likely to result in the development of fatty liver when its consumed via a beverage versus food. Similarly, one faces an increased likelihood of

developing fatty liver when consuming fructose in a single setting compared to several doses spread over 45 minutes.
"Collectively, our findings show fructose induces lipogenesis when the intake rate exceeds the gut's capacity to process fructose and protect the liver," Arany said.

"In the modern context of excessive availability and consumption of processed foods, it is easy to see how the resulting fructose spillover would drive metabolic syndrome." Researchers noted that more work is needed to determine the extent to which these findings in mice extend to humans. Additional Penn authors include Shogo Wada, Steven Yang and Bridget Gosis. The research was supported, in part, by a grant from the DRC Regional Metabolomics Core (P30 DK19525), National Institutes of Health (1DP1DK113643 and Dk107667).

Age effect: Whey protein drink suppresses energy intake in younger, but not in older men

By Guan Yu Lim 09-Jun-2020 – NutraIngredients Asia

Protein drinks work differently in suppressing appetite and energy intake for older and younger men, according to a new study.

In the younger population, protein nutritional supplements are often used to suppress energy intake, build muscle, and aid weight loss. They are also commonly used by older consumers for maintaining muscle mass, yet weight loss could be a negative consequence among this population. Therefore, researchers from New Zealand, Australia and Norway conducted a randomised, double-blind study to see how protein drinks work differently according to age.

They enrolled 13 older men (average age: 75) and 13 younger men (average age: 23). All participants in this study were healthy. There were four drinks (450mL) provided; a control drink (2kcal), and three protein-rich drinks (whey protein-280kcal, whey protein with fat-280kcal, whey protein with carbohydrate-504kcal). The drinks were given on four separate days after an overnight fast. Energy intake was determined at a buffet meal three hours after drink ingestion. The study reported that energy intake after consumption of pure whey protein drink was significantly reduced by 100 ± 54 kcal in the younger men, however, it was significantly increased by 49 ± 42 kcal in older men. In addition, energy intake after consumption of whey protein drinks with fat or carbohydrate was also reduced more in younger men than older men, thus displaying its functionality as a weight management solution for younger participants.

Furthermore, older men compared to younger men showed higher overall perceptions of the desire to eat, and less overall fullness after drink ingestion ($p<0.05$). Researchers said the reduced hunger in younger men compared to older men suggest that older people experience lower sensitivity of the appetite-suppressing effects of mixed macronutrients as well as protein.

"Older people may have a decreased perception of gastric distension, which was associated with lower suppressive effects on appetite perceptions and energy intake in older compared to younger men." Researchers said these findings confirmed that there was a reduced suppression of energy intake in response to whey protein-rich drinks in older compared to younger men. They acknowledged several limitations in their study included a small sample size, and only recruiting male participants. "Only male participants were included, as men have been shown to be more likely to show the suppression of energy intake than women, although this difference was not found between older men and women. The effects of this study should be confirmed in an undernourished group of older adults, as this population is the most likely to use and benefit from nutritional supplements."

In addition, they only studied whey protein and explained that "the results may be different for other proteins, as there is evidence that protein source can affect postprandial gut hormone, amino acid profiles, and appetite." Researchers concluded that the ability of protein-drinks to suppress hunger and energy intake were reduced in older participants, and can continue to be used by the older population to preserve muscle mass and function, without weight loss.

High-salt diet impacts health of the gut microbiome

June 15, 2020 DAILY NEWS IFT

A study published in the journal Hypertension suggests reducing salt intake can benefit the gut microbiome and blood pressure in women with untreated hypertension.

In the randomized, placebo-controlled study, the researchers examined the blood of 145 adults aged 30–75 with untreated high blood pressure who were enrolled in a previous study at the Queen Mary University of London. Because stool samples were not taken on the study participants, the researchers couldn't look more directly at the gut microbiota, so instead measured circulating short-chain fatty acids (SCFAs), the primary metabolite produced by gut microbiota. SCFAs are known to play a role in blood pressure regulation. These small metabolites originating from the gut get absorbed into the entire circulation, binding to receptors on the lining of blood vessels and in the kidneys, regulating things like the release of renin, an enzyme that works to keep the kidneys well perfused and a major player in blood pressure control. Blood levels of SCFAs can be considered an indicator of the health of the gut microbiome. All the study participants were given two weeks of detailed instruction by nurses on how to lower their sodium intake to about 2,000 mg daily, information that was reinforced throughout the study. Half of the participants received either a sodium tablet or placebo tablet nine times daily for six weeks, then switched groups. According to study author Haidong Zhu, a molecular geneticist at the Georgia Prevention Institute at the Medical College of Georgia at Augusta University, there is increasing evidence that the microbiome has a direct role in regulating blood pressure and how the average American high-salt diet can interfere with a healthy direction. The researchers' hypothesis was that even a modest reduction in salt intake would alter concentrations of circulating SCFAs and lower blood pressure. The researchers found that just six weeks of a daily sodium intake close to the 2,300 mg recommended by groups like the American Heart Association, resulted in increased levels of all eight of the SCFAs. The increased SCFA levels were consistently associated with lower blood pressure and enhanced blood vessel flexibility. "Sodium is a factor in both sexes, but the impact in relation to the gut microbiome seems more in females," said Zhu in a press release. "We need to study it further to see if that is true and why it's true if it holds." It may be that a high-salt diet affects blood pressure through different pathways in males and females, she added.

Hop extracts may boost cognition and mood in health older people: Kirin study

By Stephen Daniells 02-Jun-2020 – NutraIngredients Asia

Daily supplementation with matured hop bitter acids may improve mental processing speed, attention, and concentration in healthy adults aged 45 to 69, says a new study from beverage giant Kirin Holdings Co.

Twelve weeks of supplementation with 35 mg per day of the matured hop bitter acids (MHBA) also led to significant reductions in mental stress after intellectual work, reported scientists from Kirin's Central Research Institute, Juntendo University Faculty of Medicine, and the Fukushima Healthcare Center in the Journal of Alzheimer's Disease. While the participants were classed as healthy, they did all have Subjective Cognitive Decline (SDC), which the US CDC defines as "the self-reported experience of worsening or more frequent confusion or memory loss". "… early intervention through MHBA supplementation in persons with SCD could be successful in improving cognitive function," wrote the study authors.

As reported earlier this year by our Asian edition, Kirin is planning to develop a range of food and beverage products with the matured hop bitter acids positioned for cognitive function. Kirin Holdings has partnered with Dentsu for a joint venture called INHOP Co. to tap on new scientific health evidence of Kirin's mature hop bitter acids. The new study, which involved 100 people with SDC, builds on earlier research in mice, which found that MHBA may improve memory function via stimulation of the vagus nerve (Scientific Reports , 2018, Vol 8, Article number: 15372).

The new study, which was funded by the Kirin, compared 35 mg of MHBA or placebo (35 mg of dextrin) in healthy people aged between 45 and 69 with SDC. After 12 weeks of supplementation, the data indicated that scores on the Symbol Digit Modalities Test (SDMT) that measuring 'attention' were significantly higher in the hops extract group. In addition, stress levels were lower after neuropsychological tests in the MHBA supplements group, as indicated by reduced beta-endorphin levels. "Beta-Endorphin is a marker of hypothalamic-pituitary-adrenal (HPA)-axis activity, which is used to evaluate psychological stress (e.g., stress caused by public speaking, watching stressful videos, or taking examinations)," explained the researchers. "This study suggested that MHBA intake improves cognitive function, attention, and mood state in older adults," they concluded.

FOOD SCIENCE & INDUSTRY NEWS

Nestlé develops 5× more absorbable iron

18 Jun 2020 Nutrition Insight

Nestlé Research has developed an iron compound that is five times more absorbable in certain situations, compared to traditional stable iron forms, without compromising food quality.

In collaboration with Chalmers University of Technology and ETH Zurich, the food giant has shown that the compound – which contains iron uptake inhibitor phytate and the iron uptake enhancing corn protein hydrolysate – can be used to effectively fortify bouillon to address deficiency in low-income countries. "Our research is still ongoing and we look at many aspects, including bioavailability, stability, taste, color and texture. Additionally, new solutions need to be affordable. The technology is still in the research and development phase so we are unable to provide further details on the timeline. The compound as well as its underlying technology is proprietary to Nestlé. However, we are still in the research and development phase so we are unable to comment on future applications," a Nestlé spokesperson tells NutritionInsight.

Ann-Sofie Sandberg, Professor of Food Science at Chalmers University of Technology, adds that it is a challenge for the food industry to make plant foods with a high bioavailability of iron, which is important with the on-going protein shift. Nestlé's compound is bound to amino acids, which makes it more absorbable than stable iron compounds, such as ferric pyrophosphate. Traditionally, the forms of iron that were most absorbable are chemically reactive, meaning it affects the color and taste of the food. This also contributes to food perishing and being destroyed. However, fortifying foods such as bouillon or stock is a cost-effective way to prevent iron deficiency, especially in low-income countries. "Unless side effects which we have not yet foreseen arise, we are hopeful that food fortified with this new ferric phytate compound could be of great interest in helping to reduce human suffering worldwide. However, further research is needed here," notes Sandberg.

Undergoing extensive testing

Nestlé first tested the compound's stability and effect on taste, color and odor. Then, the Chalmers researchers, including Sandberg, examined the iron uptake in human intestinal cells exposed to the bouillon fortified with different variants of the monoferric phytate compound. To take fortification to the next level, Nestlé then prepared variants where the amino acids were replaced by the hydrolyzed protein of corn and soy. The advantage of these proteins is that they cost less to produce. In addition, corn protein is not associated with allergies, so it is particularly suitable for use in food.

"When we compared the rate of iron uptake with the new compound against that of ferrous sulfate, we could see that the intestinal cells exposed to all the different varieties of fortified bouillon had a good iron uptake. Ferrous sulfate is very readily absorbed, but is unsuitable in food because of its high reactivity," says Nathalie Scheers, Associate Professor of Molecular Metal Nutrition, who has led the development of the cell model for studying iron uptake.

Meanwhile, a human study from Nestlé and ETH Zurich showed that the iron absorption from the fortified bouillon with the hydrolyzed corn protein compound was twice the rate compared to ferric pyrophosphate, which is often used today for iron fortification of foods outside Europe. When the new compound was tested in foods containing iron absorption inhibitors, such as corn porridge, the absorption was five times as high compared to ferric pyrophosphate.

Addressing plant-based side effects

Nearly a quarter of the global population suffers from iron deficiency, which is mainly prevalent in women of childbearing age, young children and adolescents. Severe iron deficiency can lead to premature birth, increased risk of illness and mortality for mother and child, as well as impaired development of brain function in children. According to the researchers, the situation is most serious in low-income countries where the diet is mainly plant-based.

Cereals and legumes are rich in iron, but the iron is not available for absorption by the body. This is mainly because these foods also contain phytate, which inhibits iron absorption by forming insoluble compounds with iron in the gut. "Our efforts have been focused on adding essential micronutrients to products that are widely used in the local cuisine in such countries. One example is the fortified Maggi bouillon cubes in Central West Africa. Of 185 billion servings fortified with iron, vitamin A, zinc or iodine (or a combination) globally, 114 billion servings were provided in Central and West Africa alone," says the Nestlé spokesperson.

Plant-based diets are also on the rise in many high-income countries, which is creating new nutritional needs. According to Innova Market Insights, there has been a 23 percent average annual growth of F&B launches tracked with vegan claims globally between 2015 and 2019. Notably, 23 percent of global consumers say that vegan alternative food launches are healthiest. Accordingly, Nestlé is fortifying its plant-based products with relevant micronutrients where possible. For example the Ninho Forti+ beverage is a plant-based alternative to milk thatis fortified with several micronutrients including iron, details the spokesperson.

Sandberg further details that iron bioavailability in plant-based foods can be improved with the use of food processing techniques. These include fermentation, malting, hydrothermal treatment. Enzymes can also be added to degrade inhibitors and increase enhancers, while meals can be combined with ascorbic acid-containing foods. In April, industry welcomed new guidelines from the World Health Organization to detect iron deficiency and overload to prevent severe consequences, such as anemia and poor cognitive development in children. In the preceding month, the UN's Food and Agriculture Organization had highlighted that biofortification can also address iron deficiency.

By Katherine Durrell

Freeze-drying comes to fore in nutraceuticals

15 Jun 2020

Freeze-drying technology is seeing a resurgence in nutraceuticals thanks to its ability to maintain the viability of cells in the food product, which is as important as ensuring a long shelf-life.

This is according to Diana Morris, Country Manager UK at European Freeze Dry, who tells NutritionInsight about the potential for the technology to grow further. She also details the challenges of working with various original ingredients, which requires a range of freeze-drying methods. "An extremely gentle drying process is needed to ensure a good-quality final product that continues to offer health benefits. This is while creating a supplement that won't deteriorate over a long period of time. Freeze-drying removes the water content from products over the course of up to 72 hours, leaving the final product structurally stable and maintaining all the nutritional and health benefits of the original product," she explains.

Morris continues that compared to more aggressive drying methods such as spray drying or air drying, freeze-drying methods are proven to retain the purity of the product. This is even when they are ground down into a powder. Therefore, delicate ingredients can still be dried for a longer shelf-life without impacting the quality of the product. Additionally, freeze-drying means that there is a much-reduced potential for microorganisms existing in such low amounts of water, ensuring that nutraceuticals can stay safe to consume for up to two years.

At Europe Freeze Dry, all products for freeze-drying start as frozen raw materials before undergoing a process known as sublimation. A deep vacuum is applied, creating a condition where ice or water cannot exist. The pressure from the vacuum, with a controlled amount of heat applied, causes the ice to leave the product as a vapor trail. This is then captured on an ice condenser within the freeze drier, upon which the vapor forms again as ice.

After 24 to 72 hours, the product can be supplied as a stable supplement or ground down into a powder, which can be inserted into tablets. The process means that the product also retains its natural color, shape and nutritional characteristics. For nutraceutical producers, raw materials such as rosehip, elderberry or animal liver can be packaged in a tablet. This can be supplied to chemists or sold online, meeting the consumer demands for new superfood supplements. "Additionally, many customers have run trials on the bioavailability of their products with favorable results. The freeze-drying process can create larger or more intensive doses. However, numbers of bioavailability are determined and evaluated by the customer rather than ourselves, the processor," details Morris.

Room for expansion

Understanding the nature of a compound or product and how it will react in the freeze-dryer process is always the initial challenge, explains Morris. "Each original ingredient is different, and as a result, we have to work with the nutraceutical company to test and

scale the best methods to freeze-dry without losing the key nutrients. Some ingredients can handle a quicker freeze-drying process at a higher temperature without being altered. Meanwhile, others require a more gentle approach." The company uses trial drying in its laboratory dryers in both the UK and Denmark to fully understand the properties of a product before scaling up to mainstream manufacture. "This also gives our customers confidence that the process works and retains the quality of the original product when we are commission-drying their product," says Morris. She continues that the company has been freeze-drying products destined for nutraceutical applications for many years, be it enzymes, fruits or seaweed. "However, we are now seeing more growth in applications relating to men's health, general well-being and enzymes for a healthy gut," concludes Morris.

In May, European Freeze Dry noted that freeze-dried foods are in the spotlight with the ongoing COVID-19 pandemic, with many people staying at home and being more resourceful with cooking and ingredients. Last week, the company then unveiled a range of gourmet ingredients designed for snacks and ready meals with a shelf life of up to two years.
By Katherine Durrell

Ingestible beauty: Experts peg synergies and the microbiome as future trends

11 Jun 2020 Nutrition Insight

In part one of this Special Feature on beauty-from-within, NutritionInsight spoke with experts who discussed trending ingredients and their innovative delivery methods. Part two explores the most important demographics for ingestible beauty, as well as the future trends that the space is expected to welcome as collagen may be nearing the "point of saturation." Ingredient synergies, the microbiome in relation to skin, inclusivity for male-oriented skin care and affordable beauty are pegged as major future trends in this arena.

"Given the economic situation approaching, we expect to see a rise in the 'Masstige Beauty.' This means more affordable products – yet with a touch of premium or prestige beauty," notes Florencia Moreno, Market Analyst at Rousselot Health & Nutrition. "Another big beauty trend is brewing around inclusivity, from male personal care and beauty to gender-neutral beauty products. Finally, and definitely the most important next big trend, is Healthy Beauty. This includes not only aesthetic attributes, but also an overall active and wellness lifestyle focus. On top of this, collagen peptides will keep on scaling up its place in the ingestible beauty segment, where it has been considered by numerous news and beauty outlets as the beauty ingredient for 2020 and beyond," Moreno highlights.

David Tetzlaf, Director of Marketing at Evolva, says that he sees beauty and fitness intertwined as people search for holistic products that can support overall wellbeing. One example of a multi-functional ingredient is collagen, with many consumers taking it for both its beauty-from-within benefits and its ability to support bone and joint health. Resveratrol falls in this multi-functional category as well since it not only supports beauty-from-within but can also support bones and cardiovascular health, among many other benefits demonstrated in several clinical studies, he explains.

Carotenoids are a great example of a synergistic ingredient. They help influence overall skin appearance and even balance skin's natural collagen levels.While collagen is a staple ingredient in the space, more ingredients are emerging that can benefit the skin, thus starting new trends. "I think that the ingestible beauty space is very familiar with collagen – almost to the point of saturation. Consumers understand its benefits and have integrated it into their beauty routines. They are now looking for ingredients that have synergy with collagen and even add additional benefits," says Laurentia Guesman, Product Manager, Carotenoid Formulations at Lycored. "Carotenoids are a great example of a synergistic ingredient. They help influence overall skin appearance and even balance skin's natural collagen levels, making them perfect partners," she adds.

Isabel Gómez, Global Marketing Manager, Nutraceutical Ingredients at Lubrizol Life Science notes that she expects to see more launches that include clean, natural, transparent ingredients with scientific backing coming in more on-the go delivery formats. "This trend is mostly driven by consumers demanding more naturalness, health claim-validated ingredients and convenience in the products they buy. Also, I would expect a significant focus on the field of nootropics given the growing knowledge of the importance of mental health to maintaining a healthy lifestyle that can also impact our skin appearance," Gomez underscores.
According to Marcia da Silva Pinto, Technical Sales and Customer Support Manager at Evolva, the next big trend will come from better understanding of how the gut microbiota can influence several elements of health, including the

skin. Silva Pinto notes that Evolva is collaborating with Northumbria University in the UK to bring insights into how resveratrol supplementation can modulate the gut microbiota composition toward a healthy gut.

Targeting the right audience

According to Gomez, there seems to be global growing interest in beauty supplements and functional foods, as consumers have realized that they play a part in supporting their needs of skin, hair and nails. Additionally they can counter damage linked to temporary COVID-19 lockdowns or salon closures. "We continue to see the age demographics shift downward as younger women are seeking products as preventative measures to counteract the oxidative stress from UV, pollutants, and other environmental factors," says Evolva's Tetzlaf. Evolva's Silva Pinto also explains: "Beyond age, we also see regional differences in interests for skin-related products. For instance, in Asia there is a significant interest in ingredients that can provide efficacy as skin whitening agents. Meanwhile in Europe and the Americas, there is a much bigger interest in skin appearance related to wrinkles, luminosity and hydration."

Beauty-from-within products speak to a range of consumer groups. Older Millennials are more aware than past generations that beautiful aging begins in the twenties, according to Lycored's Guesman. "Preventing damage and caring for your skin earlier on in life pays dividends later on, and certainly provides better outcomes than treatment once the damage has been done. Lycored recently conducted a survey and found that looking good has the same importance for men as women. Furthermore, a significant proportion of respondents aged 18-35 believe it is more important for men to look good than women. This data suggests there is an increasing market for products that can help Millennial men achieve this goal," she adds.

For Rousselot's Moreno, beauty-from-within has shifted more into a healthy lifestyle trend and market segments have also expanded to include not only mature consumers but also younger audiences. "Practically, ingestible beauty demographics range from Gen Z and Millennials all the way up to Gen X and Baby Boomers. There is a beauty need to be fulfilled in every stage of life, for example anti-aging effects, such as reducing wrinkles or a focus on everyday beauty concerns like growing hair or nails longer, to mention a few," Moreno concludes. With beauty and aging gracefully remaining an important cultural aspect across the globe, the beauty-from-within space is expected to keep growing at a fast pace. As more holistic approaches like overall health and wellness for beauty emerge, industry will have to keep up with the demand for natural ingredients, synergies and an all-inclusive approach for all demographics.

By Kristiana Lalou

Medical probiotic for Type 2 diabetes? Pendulum launches synbiotic for insulin management

05 Jun 2020 Nutrition Insight

Supplement company Pendulum Therapeutics has launched a medical probiotic called Pendulum Glucose Control that can help manage Type 2 diabetes.

The company affirms that the product's specific bacterial strains can help metabolize fiber into butyrate, a short-chain fatty acid that is key to modulating insulin. The microbiome-targeted solution provides a novel avenue in diabetes management, as gut health and immunity have increasingly become spotlighted throughout industry. "We are taking a new approach to managing Type 2 diabetes through the gut microbiome with the launch of Pendulum Glucose Control. It's the first and only medical probiotic clinically shown to lower A1C and blood sugar spikes," Dr. Colleen Cutcliffe, Pendulum Co-Founder and CEO, tells NutritionInsight. A1C is a form of hemoglobin that is chemically linked to a sugar and is often indicative of diabetes.

Key benefits of Pendulum Glucose Control include managing healthy glucose levels and unlocking fiber potential to produce beneficial molecules that energize cells in the colon. Moreover, the product assists in strengthening gut lining to help prevent harmful bacteria from causing gut inflammation. By supporting butyrate production, the naturally occurring metabolite that is lost in people with Type 2 diabetes, Pendulum Glucose Control helps maintain insulin and glucose balance, according to Dr. Cutcliffe.

"The connection between our gut microbiome and immune system has received increased attention lately with the global pandemic. COVID-19 primarily affects the respiratory system. However, our gut microbiome may play a key role in how our body – and ultimately, our immune system – reacts to the virus. For people with Type 2 diabetes, a healthy immune system is especially important during this time," Dr. Cutcliffe clarifies. In related developments, Public Health England (PHE) released a data review that found that among deaths with COVID-19 mentioned on death certificates, a higher percentage specifies diabetes than all-cause death certificates.

A "unique blend of novel probiotics"

Using a high resolution microbiome discovery platform, Pendulum Therapeutics was able to identify bacterial strains and their associated functions that were high in healthy people and low or entirely missing in people with Type 2 diabetes. The company's patented formulation is a synbiotic that contains Clostridium beijerinckii WB-STR-0005, Clostridium butyricum WB-STR-0006, Akkermansia muciniphila WB-STR-0001, Eubacterium hallii WB-STR-0008 and Bifidobacterium infantis 100. "Aside from our probiotic strains, we have also included a prebiotic – chicory inulin – to help feed the probiotic strains," Dr. Cutcliffe adds. "We believe sharing Pendulum Glucose Control with consumers now offers a new microbiome-targeted solution to those struggling during this time of uncertainty in regards to their health and well-being," she states. As Pendulum is reinventing and redefining how people manage specific chronic illnesses and diseases, its target audience consists of individuals with Type 2 diabetes but also prediabetes.

Medical food spotlighted

The company stresses that its newest launch is a medical food that should be taken under the supervision of a physician. "However, we developed the term 'medical probiotic' as a new class of probiotics that deliver clinical efficacy for the management of a specific disease or condition with targeted and novel probiotic strains," Dr. Cutcliffe affirms. "The probiotic strains in a medical probiotic have been fully DNA-sequenced to determine the microbial function for modulating the microbiome of a particular disease. Unlike 'off-the-shelf' probiotics with general 'gut health' claims, medical probiotics provide clinical rigor to substantiate a dietary management claim," she details.

The nutrition industry has been making significant moves in the field of medical food. Last September, functional foods company SternLife developed a portfolio of nutritionally complete medical foods to tackle malnourishment and dysphagia. BASF is also positioning its Prebilac 2'-FL for medical food usage beyond infant nutrition in dietary supplements, while a joint venture between specialty pharmaceutical company Tenshi Kaizen Private and US-based DolCas Biotech, LLC also aims to explore the medical food space.

By Anni Schleicher

A new approach to reducing salt while maintaining taste

IFT NEXT June 12, 2020

The dangers of a high-sodium diet have been well documented, but a new technology devised by scientists from Washington State University could help reduce sodium in processed foods while retaining taste and texture.

The dangers of a high-sodium diet have been well documented, but a new technology devised by scientists from Washington State University could help reduce sodium in processed foods while retaining taste and texture. The researchers used microwave assisted thermal sterilization (MATS) to kill pathogens without reducing flavor intensity, a common problem that occurs with retort, the current method used to help preserve food. During the study, which was published in the Journal of Food Science, tasting panels evaluated mashed potatoes produced using both methods. An e-tongue assessed the impact of the reduced salt and the effect on the intensities of pepper, garlic, and other ingredients. Although pepper intensity remained the same for both fresh potatoes and those produced using MATS, it was reduced in retort processing.

Carolyn Ross, lead author of the study, suggested that the retort process takes longer to rise to the appropriate temperature and longer to cool down, resulting in texture and flavor changes in the food being treated. Since the MATS process take less time, the impact on food flavor and texture is reduced. Additionally, when pepper flavor is retained, less salt is needed.

The researchers believe that a salt reduction of up to 50% could be attained using the MATS processing method because the flavor of other herbs is enhanced. Although MATS is a relatively new technology, Ross believes it holds potential for reducing salt and maintaining flavor in processed foods. "We have to make a product that people want to eat," she said in a press release. "And there are a lot of older adults that eat prepared meals because of convenience and safety. So if we can reduce salt intake from those foods, and still have pleasant flavors, it could be hugely beneficial."

Cheap, simple protection: India invents edible fruit coating to extend shelf life and overcome cold chain challenges

By Pearly Neo 28-May-2020 – Food Navigator Asia

Researchers in India have developed a new coating from oat and wheat to be used for various fruits that it says can extend shelf life and overcome the country's cold chain challenges in a cheap and effective manner.

The technology was developed by the National Agri-Food Biotechnology Institute (NABI), which is housed under the country's Institute of Department of Biotechnology. NABI has filed a patent in India to stake claim over the formulation of the coating. According to NABI, the technology was developed to address the 'absence of postharvest treatment, traditional storage on farms, infestation of microorganism and pests, and non-availability of processing methods' in the country.

"These factors are responsible for the highest rates of postharvest fruit and vegetable losses in India," the institute said in a formal statement. "Due to limited availability of cold chain facilities, especially during storage and transportation, development of coating materials to prolong the shelf life of fruits and vegetables is [a] high priority."

The researchers developed composites that could be coated onto the fruits from wheat straws and oat bran. The component extracted from wheat straws was the cellulose arabinoxylan, whereas β-glucan stearic acid esters (SABGs) were extracted from oat bran. "The components were formulated into] an aqueous emulsion-based coating, which was coated on fresh fruits such as apples and pears," said the researchers. "The formulations were applied at various concentrations (1% to 4%) to the fruits to determine the efficacy for postharvest shelf life improvement, [and we found] that in apples, the shelf life was significantly enhanced."

Across several studies, the shelf life of several varieties of apples were found to improve under different humidity levels. In one of the studies, Royal Delicious apples were either not coated, coated with the arabinoxylan-SABG coating or coated with the commercially available shellac, then stored at 22°C across a minimum of 30 days at relative humidity levels of either 65% or 85%. "Application of both AX-SABG (1–4%) and shellac (1–4%) coatings were found to significantly reduce weight loss, respiration rate, fruit softening process, ripening index, colour degradation and polyphenol oxidase activity compared to control (no coating) in both conditions," said the researchers.

"However, an AX-SABG coating was more effective in reducing fruit decay and loss of aroma volatiles, [confirming] the potential benefits of applying this coating to extend the shelf life and quality of apples especially during transportation and storage."
Similar results were found in a separate study conducted on Rich Red apples across 45 days, where aroma loss and microbial spoilage were found to be the chief attributes that were best maintained when the NABI developed coating was used. "The overall results show that AX-SABG coating has the potential to be an alternative to animal derived shellac coating in India by improving the quality and post-harvest storage life of apple specifically during transportation and storage," concluded the researchers.

According to NABI, the coating will cost between INR0.30 (US$0.0041) to INR0.50 (US$0.0068) per apple when it is commercialised. "The coating technology is cost-effective, [the pricing will be] very much comparable to food grade commercial wax/resin coating," said the institute. "It also shows potential for several other fruits such as peaches and bananas. Other studies have shown that the coating improved quality of coated bananas by maintaining uniform ripening without significant blackening at room temperature up to seven days." NABI also has a non-disclosure agreement with New Delhi's R.G. Industry to commercialise the technology, according to Indus Dictum.



REGULATORY NEWS

RDA enforcement strife: India warns supplement firms to adhere to regulations

By Tingmin Koe 24-Jun-2020 – NutraIngredients Asia

Health supplement firms have been threatened with enforcement action if they fail to adhere to permitted recommended dietary allowance (RDA) levels for vitamins and mineral products, regulator FSSAI has said.

The Indian regulator has directed food safety commissioners of all states to ensure health supplements firms comply with the rule. Stringent actions may be taken against defaulters, which industry experts told us could include withdrawal of products from the market and revoking of the FSSAI license. The rule to comply with RDA limits was spelled out in The Food Safety and Standards Act 2006, which defines foods for special dietary uses (FSDU), functional foods, nutraceuticals, or health supplements as "minerals or vitamins or proteins or metals or their compounds or amino acids in amounts not exceeding the RDA for Indians."

However, the regulator said that products flouting the rules have time and again surfaced in the market. "It has come to the notice of FSSAI that licenses for the food products … are being issued by the Licensing Authorities without duly scrutinising the RDA values of vitamins, minerals, and amino acids in the products…" To arrest the problem, FSSAI had advised central and state licensing authorities to review the RDAs that firms have listed in the existing licenses.

When necessary, they will need to issue notices to the firms to modify their product in compliance with the regulation, the regulator said in a statement. According to the permitted RDAs values set by the Indian Council of Medical Research (ICMR), the RDA for popular vitamins such as vitamin C is 40mg and that of vitamin D at 400 IU. Information on the permitted RDAs values have been made available on FSSAI's website last February. Non-compliant products have existed in the market partly because of difficulties in enforcing the rule, said Indian market expert Amit Srivastava, adding that the possibly penalty could include fines and license revoke.

"The rule has been there all along. The challenge that FSSAI is facing is enforcement. Because it is understaffed, it has to depend on the food inspectors or food commissioners to implement this." Expert Nutraceutical Advocacy Council (ENAC) founder Sandeep Gupta added that the implication for noncompliance could include product withdrawal.

There are, however, some instances when a product can exceed the RDA limit. This applies to Foods for Special Dietary Uses (FSDU) and Foods for Special Medical Purpose (FSMPs). The regulator pointed out that these products could exceed the RDAs levels as per schedule-III of the Nutraceuticals Regulations. Gupta added that with the latest notification from the FSSAI, manufacturers making FSDUs and FSMPs would need to submit scientific evidence to justify the RDA levels in their products. He said that the industry had asked to be given time until end August to submit the relevant information. On the other hand, he said the ICMR

had also submitted a proposal on adopting Tolerable Upper Limit (TUL) on these products to the FSSAI.

Under TUL, the vitamin, mineral content in a product will be higher than the permitted RDA values but within tolerable limits. "The TULs establishes safety limits and provides a scientific support justifying the level of vitamins, minerals present in the product," he said. India is one of the countries with the lowest RDA for vitamins. Its RDA for vitamin C is 40mg, much lower than its other APAC neighbours China, Japan, and Singapore, where the RDA is 100mg. Other countries with relatively low RDA are Australia and New Zealand at 45mg for vitamin C.

In most countries, exceeding the RDA does not constitute an issue. Against the backdrop, researchers have urged health authorities to raise the RDA guidelines so that the public can take in more micronutrients to boost their immune system in light of COVID-19. However, Srivastava cautioned against the wholesale replication of RDAs values of other countries in India. "To say that the RDA set by ICMR is low, that's a wrong statement. In the past, the protocol was set by the Western community. But let's understand that the Western community has got a larger basal index of the body. "Hence, they may require larger quantities of ingredients," he said.

He added that overloading the body with high quantities of vitamins did not translate to full absorption. In the case of vitamin C, he pointed out that no more than 100mg would enter the blood stream at any one time. Gupta, on the other hand, said that the industry has been discussing with the FSSAI on raising RDA limits for the regular health supplements since 2016. "The whole purpose of bringing TULs was to improve the status of ICMR's RDA because it was clashing with standards set by the drug authorities."We have given recommendations, which is to change the value of the therapeutic and prophylactic values in the drug act and allow FSSAI to use a better RDA on the basis of TUL." But he said that due to the lockdown and change in FSSAI's administrative set-up with a new CEO, Arun Singhal, helming the organisation, there was no active dialogue on the issue happening at present.

Defending probiotics: Industry hits back at research and regulation criticism

30 Jun 2020 Nutrition Insight

The nutrition industry is fighting back against allegations that probiotics lack industry regulation and sport insufficient scientific consensus over their health benefits.

The Natural Products Association (NPA) has hit back against American Gastroenterological Association (AGA) guidelines that make no to few recommendations for probiotic use to manage gastrointestinal disorders. Meanwhile, in response to a "60 Minutes" television segment on probiotics titled "Do Probiotics Actually Do Anything?" the Council for Responsible Nutrition (CRN) asserts that the reporting "pitted one scientist's view against another's and left viewers confused about the category."

Cautious of sensationalizing the effects of probiotics on gut health, the AGA recently issued new guidelines that do not recommend probiotics for children and adults with irritable bowel syndrome. Moreover, the guidelines only make a recommendation for using probiotics in adults and children with ulcerative colitis and Crohn's disease "in the context of a clinical trial." The NPA has countered this position by stating that the AGA guidelines "falsely claim that the natural products industry is unregulated, despite being overseen by not one but two federal agencies to protect consumers from false advertising and bad actors."

Probiotics on the rise – forever? The NPA's stance is that the new guidelines are "at odds" with the overwhelming number of studies supporting the safety and efficacy of probiotics in modern medicine. However, the AGA maintains that the available evidence in favor of probiotic use to help manage gastrointestinal diseases is limited because of heterogeneity in study designs, patient populations and the specific probiotics that have been studied. "Conclusions drawn from meta-analyses or systematic reviews can be misleading if different studies with different patient populations, different reported endpoints and outcomes or different strains or combinations of probiotics are grouped together inappropriately," the AGA guidelines read.

Nevertheless, the NPA underscores that "thousands of studies" have supported the safe use and efficacy of probiotics for a range of treatments. Some include managing irritable bowel syndrome, improving liver and gut health, reducing skin rash severity in children as well as the likelihood of infection during antibiotic treatments. As the scientific community continues to research the effect of probiotics on the gut microbiome, Innova Market Insights reports that probiotic supplements are on the rise. While probiotics only represented 3 percent of supplement launches in 2015 and 2016, this rose to 10 percent in 2018. In 2019, 94 percent of launches included a digestive/liver health claim, while 49 percent were touted as supporting immune health, according to the market researcher's data.

The "chaos" of probiotic research
The television segment called into question by CRN focused on the "conflict among scientists" about whether probiotics provide any health benefit at all. What's missing is sufficient high-quality research to recommend off-the-shelf probiotics, according to the news segment. Moreover, the reporting flagged that not all over-the-counter probiotics have their intended effect.
Addressing the critique points of the news segment, Dr. Andrea Wong, Senior Vice President, Scientific and Regulatory Affairs, CRN, issued a public statement highlighting: "The segment does not feature any new research and only highlights previously published scientific studies, each with their own limitations. For example, one of the featured studies reviewed the effects of a specific combination of probiotic strains on how they modify the microbiome of the host, but did not measure important clinical endpoints, like the prevention of diarrhea after taking antibiotics," As the news segment further challenged the safety and regulation of probiotic products, Dr. Wong responded that: "The safety of probiotics is well-established through their long history of use and safety studies. Moreover, probiotic products marketed as dietary supplements are subject to comprehensive dietary supplement regulations that include current Good Manufacturing Practices (cGMPs), testing procedures, labeling and storage requirements and other practices enforced by regulatory agencies at both the federal and state levels."

Encouraging more investigation
Ultimately, the 60 Minutes news report highlighted that many scientists are "hopeful about the possibility of improving health by manipulating the microbiome," but emphasizes that more research is needed to ensure that probiotics can be beneficial for the microbiome in both the short term and the long term. Similarly, Dr. Wong states that CRN encourages more research into the benefits of changing the composition of the microbiome. "CRN reminds consumers to consult their healthcare providers if they have questions about the probiotic supplements they are taking or thinking about taking in the future," she affirms. Despite this debate, probiotics, as well as gut health in general, remain top of mind for consumers. In this sphere, World Microbiome Day took place last week, celebrated on June 27 annually. NutritionInsight spoke with experts from APC Microbiome Ireland, Chr. Hansen and OptiBiotix on the integral role the microbiome plays in maintaining good gut health.
Edited by Anni Schleicher

Healthy meat? Researchers reignite debate

17 Jun 2020

Two new studies have brought the debate on the health impact of meat consumption to the fore once again.

A German study found that the less animal-derived food incorporated into a person's diet, the lower their body mass index (BMI) is on average. Meanwhile, substituting lean, unprocessed beef for carbohydrates in a Western diet had no significant effects on the heart health of test subjects with prediabetes in a US study. NutritionInsight spoke with both papers' researchers on how their respective results may shape consumers' dietary relationships with meat consumption. "Our message is not to eat more meat. Instead, our view is that incorporation of some red meat – lean, unprocessed beef in our study – into a healthy dietary pattern should not be expected to worsen major risk factors for heart disease and diabetes," principal investigator Dr. Kevin Maki, School of Public Health, Indiana University, US, tells NutritionInsight.

The US researchers had 33 study participants with prediabetes follow either a US-style diet with below-average red meat intake for US

standards (about 1.2 oz per day), or a similar diet that contained an additional 5.3 oz per day of unprocessed, lean beef. The participants completed the crossover, controlled-feeding trial, where each subject was randomly assigned to follow one eating pattern for four weeks. This was followed by a washout of two weeks, then consumption of the other diet for four weeks. "We used a relatively large quantity of lean beef in our study to ensure that if there were any adverse effects, we would likely observe significant differences between the diet conditions. No statistically significant adverse effects [in cholesterol levels, blood pressure or insulin sensitivity] were observed. Consumption of up to three servings per week of lean, unprocessed red meat would be consistent with most recommendations from health authorities around the world," Dr. Maki affirms.

Slimmer vegetarians

Meanwhile, a separate study found that restricting animal-based products from the diet may exert beneficial effects on weight status. The large-scale study at the Max Planck Institute for Human Cognitive and Brain Sciences (MPI CBS) in cooperation with the University Hospital of Leipzig also investigated the link between an animal-free diet and emotional health. The researchers did observe study participants predominantly following a plant-based diet were more introverted than those who mainly fed on animal products. However, they did not find a significant correlation between plant-based diets being more often associated with depressive moods. The researchers included 8,943 subjects for analyses regarding diet, BMI and depressive symptoms. Using a Food Frequency Questionnaire (FFQ), linear regression models detected lower animal dietary restriction scores, meaning that higher frequency of animal-based products consumption related to higher BMI in the sample. "We indeed expected these results, which are in line with previous studies. However, we were curious if we could detect an association using a continuous measure of dietary intake of animal-based products with a FFQ in our large cohort; thus these results may allow a more nuanced view. For example, we did not separate between vegetarians, vegans and omnivores but considered the frequency of animal-based product consumption," study author Veronica Witte, Day Clinic for Cognitive Neurology, University Hospital, Leipzig University, tells NutritionInsight.

Products made from animal-based foods can be excessively rich in fat and sugar are particularly fattening, consequently stimulating the appetite and delaying the feeling of satiety, adds first author Evelyn Medawar. "Vegetarian food contains dietary fibers and has a positive effect on the microbiome in the intestine. This is another reason why they could fill you up earlier than those made from animal ingredients. People who eat predominantly vegetable foods may therefore absorb less energy," she states.

Plant-based meat alternatives: Common ground?

The meat industry continues to go back and forth, discussing the extent to which animal-based and plant-based meat consumption is beneficial for overall health. Last October, a Canadian study encouraged adults to continue consuming red and processed meat as they already do, since cutting back has little impact on health. However, a US study reported later in February that regular consumption of red and processed meats is linked to cardiovascular disease and death. Meanwhile, plant-based meat alternatives have recently come under fire for containing excessive amounts of sodium, which could be detrimental to cardiovascular health. In March, Action on Salt spotlighted the "shocking" amounts of salt and saturated fat found in plant-based and vegan meals available at British fast food outlets. This came amid calls for better transparency in meat analogs during Veganuary.

Dr. Maki envisions a symbiotic state for both plant- and animal-based meat, affirming that both lean meats and meat alternatives can be part of a healthy dietary pattern. He adds that consumers need to understand how to interpret sodium differences to maintain a diet consistent with recommendations from health authorities. "The key is to stay within recommended ranges in the overall diet. If one consumes a higher-sodium meat alternative in a meal, they will need to be more careful about how much sodium is consumed in the other foods consumed that day. Some meat alternative products are low in saturated fat and others are not," he notes.

Future research is warranted to further investigation in this space. Dr. Maki's team aims to continue studying the effects of dietary interventions on risk factors for heart disease and diabetes. "We are particularly interested in defining predictors of responses to dietary interventions. These include clinical indicators, such as amount and distribution of body fat, insulin sensitivity and triglyceride levels, as well as characteristics such as gut microbiota." Witte also affirms that her research team will follow up on their research by looking at blood measures of dietary intake, which may add precision to the questionnaires' data. "We are eager to study longitudinal effects of dietary habits at baseline on six-year-follow up measures of weight and psychological outcomes. We are also interested in checking the hypothesis that a more plant-based diet at baseline promotes healthier weight, and how this relates to mental health," she concludes.

By Anni Schleicher