

PFNDAI

# FOOD, NUTRITION & SAFETY MAGAZINE

BULLETIN JUN 2023

## PERFORMANCE NUTRITION FOR ATHLETES

Prof. Subhadra Mandalika

**MILK ALLERGY &  
APPLICATIONS OF  
ENZYMES:**

Prof Jagadish Pai

**SHELF-LIFE  
STUDIES**

Dr. Shashank Bhalkar

**CHEESE AND  
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# EDITORIAL

## Growing Fish Industry in India

Indians especially coastal ones love their fish. Goans, Keralites and Bengalis have perfected the art of fish culinary so the Indians elsewhere and globally people have been searching their exotic dishes. We have Malvani cuisine that has made good mark on fish eating community. Parsis have their own patra fish and other mouth-watering delicacies, which have enriched the Indian culinary diversity. There are special recipes in many other regions and each has a typical attribute.

Although fishy smell may put some people off, the bona fide fish eaters love that. Some varieties have strong smell. Also marine fish have more smell than sweet water fish or from aquaculture. Traditional fishing took long time after catch before icing or processing, that allowed stronger smell to develop. Now the bigger trawlers have on-board facility for processing or at least icing so the smell is not pronounced so even those who prefer no smell can enjoy the fish eating.

Fish has been shown to be very healthy with not just protein and omega-3 but the lack of many undesirable substances red meats contain, which makes it safe for heart.

There has been much export of fish from India but now the local market has also grown substantially as many Indians have started consuming a variety of fish dishes. Many restaurants have been offering exotic dishes tempting both regular and occasional fish eaters.

There are varieties of fish products available in market. Not just the fresh fish market operated by fisher-women but stores have been stocking both chilled and frozen fish in a variety of forms including whole, filleted, various cuts, bone-less and even battered and partially or fully cooked and frozen. Many convenience products have made it easier to buy and take home and cook or prepare it with ease. This certainly has made more people buy them as cleaning and preparing for cooking is a big tedious chore.

There are many who prepare and deliver the ready-to-cook products with spices and garnish already applied so this would not only save a lot of efforts but will not require cooking talent to prepared delicacies.

All this has helped increase the market as more people started enjoying fish as well as other seafood like prawns. The social media has also helped food industry. Not only can the smaller entrepreneurs can showcase their products, amateur cooks show their talents and some opinion leaders help some products or establishments telling them about their experiences.

India is ranking second in the fish production, which includes both marine and aquaculture and government is helping with facilities and infrastructure that would help the industry further.

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

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# PANIC MEDIA



AUTHOR

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We have seen often that social media posts based on recently published scientific articles from reputed universities and good journals get the stamp of authentication since they are from reliable sources. But what the reader does not see is that the alarmist conclusions are based on spliced sentences picked up from the papers without really looking into the discussions, design, and data in the paper.

An example is the news about the negative effects of Non-Nutritive Sweeteners (NNS). WHO did say that they have no benefits on weight loss, but the social media posts went beyond to create panic.

WHO will not recommend if the NNS will cause harm, even for diabetics but it did. There was another paper on Sucralose causing DNA damage. These were only in vitro, or test tube methods and we do know that when you add anything to cells in vitro they could cause DNA damage but that doesn't mean it happens in the body. The safety of any additive or for that matter any chemical is dependent on the dose and the dose in a test tube or petri-dish is several hundred fold higher than the quantity that reaches the cells in the body or intestines.

It will be good if social media were to see the reports of the Joint (WHO and FAO)Expert Committee on Food Additives (JECFA) which reviews several hundreds of published articles on a single additive that includes mechanistic, bioavailability, in vitro studies, animal data as well as human exposure levels and published adverse events to make sure that the levels of any additive permitted for human use is no less than a hundred times lower than any adverse effect level. More often even at many times higher levels also adverse effects are not seen.

If such is the case, a single or a set of papers that use methods more for academic knowledge cannot be immediately applied to public health. It was said that the NNS caused "Leaky Gut". The levels at which such a thing happens is many times more than even the highest consumer levels. No one either tells you, that one of the main causes for a "Leaky Gut" which may lead to Chronic Systemic Inflammation and the consequences thereof is Sugar and highly refined carbohydrates. Which means using "Little" sugar rather than a miniscule amount of a non-nutritive sweetener would cause relatively greater inflammation and higher risk of morbidity in diabetics. While it is impossible to prevent either social media craze or even the media hype, dissemination of the right kind of knowledge based on systematic and evidence-based reviews is extremely important wherever possible.







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# OPEN DATING: USE BY DATE; BEST BEFORE DATE; EXPIRY DATE?



AUTHOR

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

All foods spoil, whether packed or not. It is quicker for some foods than for others. Sensory attributes signal changes much before a health hazard develops. Consumers make sensory judgements routinely and expertly. Appearance, colour, firmness, smell and where permissible taste is tested in selecting fruit, vegetables or grain. In pre-packaged food, sensory quality is known only when unpacked. Open dating is therefore the only way to let everyone know until when the food is good to consume.

Open dating was originally intended for efficient stock rotation to supply consumers a "within date" product. The language crafted for this purpose perhaps did consider its likely impact on consumer behaviour. People now use date labels according to their own (mis) understanding. For

example, a product too close to its 'best before date' is taken as nearing an 'unusable date'. Leaving behind such packs on the shelf leads to food wastage, as no one picks it up once past the date.

In a research survey more than 53% consumers would dispose a yogurt pack one day past its "use by date", compared to 34% who would do the same for one day past a "best before date". A simple change in language from 'use by' to 'best before' gave consumers more confidence in judging it good to eat. In another study, EU consumers were asked if they knew what 'use by date' stands for before they start throwing food away: 53% got it wrong.

If consumer behaviour is to change - and reduce wastage - language along with extensive consumer education must convey true meaning. Since the original purpose is to rotate stock in a timely way, the onus lies in the supply chain to get their product

quickly to the consumer. It is unlikely there is any benefit to use up shelf life just to compensate for poor logistics and turnarounds. US FDA recommends not using words like "sell by" or "expires on" because this obscures the meaning of a date label. The recommended terminology "Best if Used By" signifies that the date is an indicator and not a cutoff point.

Regulators need to make the call for change. According to US FDA, \$32 billion dollars' worth of food is mistakenly thrown out by consumers misreading date-labels. In the EU, about 10% of 88 million tonnes yearly waste is attributed to date marking.

India is likely to have greater wastage. Consumers look for "fresh packs" based on the manufacturing dates. Younger packs are preferred even though packs with different manufacturing dates are all within expiry date. Secondly, consumers are more likely to misunderstand food dates, since only "expiry" or "use by date" are to be declared. Both the behaviour and the labelling rule leads to wastage.

The EU is to propose legally-binding targets for food waste reduction to be in place by 2023. Several countries are estimating wastage due to date marking. Additionally, US intends to standardize the date label language to improve consumer understanding. India too should do the same.

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# PERFORMANCE NUTRITION FOR ATHLETES



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(genetic makeup, age and gender). Among the modifiable factors, training strategies are recommended by coaches and sports physiologists. But success of training in improving sports performance largely depends on nutrition. Hence, the successful outcome of training depends on nutritional support. Dietary strategies for an athlete are planned according to their nutritional requirements and training schedules. Nutritional needs of athletes vary according to the type, intensity and duration of sports activity.

Sports activity is any form of organized and competitive physical activity aimed to improve physical skills and abilities while providing enjoyment both to the performers and spectators. Based on the intensity & duration, sports activities are classified into three types- endurance, resistance and intermittent sports. Endurance sports (marathon running, cycling, cross country skiing etc.) are performed for long duration under aerobic conditions. Resistance sports (weight lifting, wrestlers,

throwers etc.) involve short duration activity under anaerobic conditions i.e. low availability of oxygen. Intermittent sports (team games-Football, Hockey, Basket ball etc.) involve both aerobic and anaerobic activity.

Success in performance is the dream of every sports person. However, it depends on certain modifiable (diet, body composition and training) as well as non-modifiable factors



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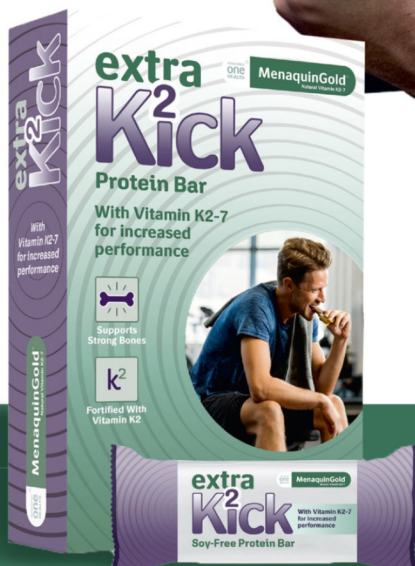
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There are majorly three phases in the life of competitive sports persons i.e. Training phase, competition phase and off season phase. Nutritional needs also change in each of these phases. Thus, nutritional needs of sports persons are highly dynamic. Nutrients perform the same functions in an athlete's body as in a non athlete's body. But utilisation of nutrients is very efficient indicating the risk of quick onset of deficiency and hence need special focus.

### Energy requirements of sports persons.

Based on the energy expenditure, sports activities are also classified into five groups as shown in Table-1. Energy requirements of sports persons from these groups are on par with their energy expenditure. Accordingly, strength sports of heavy weight category need the highest amount of energy

followed by long distance endurance, team, light weight category events and skill events.

### Macronutrient requirements of sports persons:

Among the three macronutrients, carbohydrate is the most preferred fuel source for all the sports as it generates higher amount of energy within short duration for the amount of oxygen inhaled. Carbohydrate needs of endurance sports persons are often discussed more extensively than the other categories. The Academy of Nutrition and Dietetics (AND), Dietitians of Canada (DC), and the American College of Sports

Table-2: Carbohydrate recommendations for endurance sports persons\*

| Level of activity   | Carbohydrate requirements                                    |
|---|--|
| Moderate exercise (1 h/day (h/day)  | 5-7 g per kilogram of bodyweight                             |
| Moderate to high intensity exercise (1-3 h/day)                                       | 6-10 g/kgBW/day  |
| Heavy activity ((4-5 h of moderate to high intensity exercise every day)              | 8-10g/KgBW/D   |
| Prior to the event  |  |
| Pre competition glycogen loading (<90 min activity)- "topping-off" of glycogen stores | 7-12 g/Kg BW 24 hour prior to the event                      |
| Pre competition glycogen loading (>90 min activity) "carbo loading"                   | 10-12 g/Kg BW 36-48 h before the event                       |
| During the event  |  |
| Event longer than 1-2.5 hours   | 30-60 grams of carbohydrate in 6-8% solution every 10-15 min |
| Event longer than >2.5 hours  | 60-70 grams to 90 grams/hour                                 |

\* Jäger, R. et al (2017). Thomas, D.T. et al, 2016

Medicine (ACSM) together made the following carbohydrate recommendations for endurance athletes as per the intensity and duration of activity (Table-2).

Table-1: Classification of sports persons based on their energy expenditure and energy requirements

| CATEGORY  | EVENTS  | Weight category | Energy requirement Kcal/day |
|-----------|---|-----------------|-----------------------------|
| GROUP-I   | Power Events of Higher Weight Category (80 Kg and above)<br>Weight Lifting, Boxing, Wrestling, Judo, Throwing Events  | 85 Kg           | 6000                        |
| GROUP-II  | Endurance Events: Marathon, Long Distance Running, Walking, Road Cycling, Rowing Middle and Long Distance Swimming  | 65 Kg           | 5,200                       |
| GROUP-III | Team Events, Athletics and Power Events of Middle Weight Category (65kg): Hockey, Foot Ball Volley Ball, Basketball, Tennis, Sprints, Jumpers, Boxing Wrestling Weight Lifting, Judo and Swimming | 65 Kg           | 4,500                       |
| GROUP-IV  | Events Of Light Weight Category: Gymnastics, Table Tennis, Yachting, Boxing, Wrestling, Weightlifting and Judo  | 60 Kg           | 3,600                       |
| GROUP-V   | Skill Games Shooting, Archery and Equestrian  | 60 Kg           | 3,000                       |

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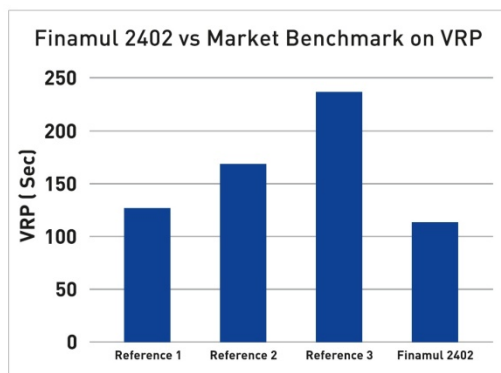
Chocolate manufacturers continuously strive to create an indulgent experience for the consumers. The major challenge is typically posed by the intricate chocolate rheology. Some of the key factors affecting the chocolate viscosity are the total fat content, emulsifiers, conching phase, duration and degree of temper. Furthermore, a complex matrix of various ingredients such as butter, cocoa powder, moisture can also play a critical role to control the overall chocolate viscosity.

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- On the other hand, low viscosity chocolates are ideal for 'enrobing & dipping' applications, where a thin coating of chocolate is desired, such as in the chocolate wafers, softy serves, or chocolate-dipped fruits.

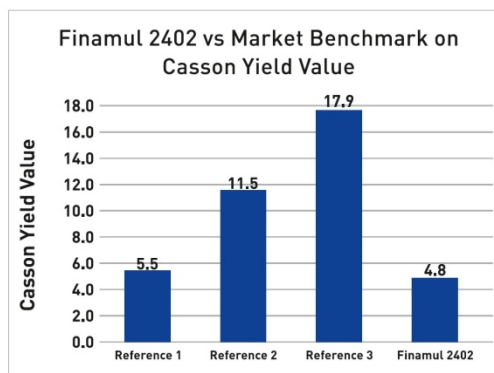


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During the long duration endurance activities, continuous availability of glucose is very essential. Hence 8-12 g/kg/day of carbohydrate intake is recommended by the International Society of Sports Nutrition (ISSN) (Thomas, D.T. et al, 2016). Consumption of 30-60 grams of carbohydrate during the event is very essential to avoid hypoglycemia induced health problems i.e. 'hitting the wall'/'fainting'. However, athletes should adapt to these strategies well ahead of competitions to avoid gastrointestinal disturbances.

High intensity resistance exercise largely uses anaerobic metabolism during which the fuel source is carbohydrate. High intensity long duration and/or repetitive strength activities might result in depletion of glycogen stores thereby increasing their carbohydrate needs. If not replenished soon, glycogen depletion would negatively impact performance.

### Protein recommendations for athletes

Appropriate protein intake is very crucial for sports persons to maintain



body muscle, quick recovery from injury and improved immunity. Protein requirements of strength and power sports (wrestlers, weight lifters, throwers etc.) are higher due to their high body muscle content and the need for anaerobic (Power) activity.

suggested by scientists in order to facilitate protein retention in the body (Moore et al., 2009). Co ingestion of carbohydrate and protein post exercise facilitates muscle protein synthesis and glycogen repletion.



Table-3: Macronutrient needs of athletes

| Type of sport/Nutrients                                | Endurance athlete                 | Strength athletes**  |
|--|-----------------------------------|--|
| Carbohydrate   | 8-12g/KgBW                        | 6g/KgBW<br>3-5g/KgBW (Weight Lifters and throwers)<br>4-7g/KgBW (bodybuilders) |
| Protein  | 1.4g/Kg/d                         | 1.6-1.7g/Kg/d  |
| Pre-Exercise (immediately prior/post exercise)         | 0.3g/kgBW                         | 1g/KgBW  |
| During exercise (if high intensity/eccentric exercise) | 0.25 g/kg/h                       | 0.5g/KgBW  |
| Post exercise(within 0-2 h or pre-exercise)            | 0.3 g/kg BW                       | 1.0-1.2g/KgBW  |
| Fat  | Not less than 20% of total energy | 20-35% of total energy   |

\*Kenneth Vitale and and Andrew Getzin (2019)

\*\*<https://www.tandfonline.com/loi/rjsp20>

Endurance sports persons' protein needs vary as per the phase i.e. pretraining, during and post training. The protein needs of strength athletes are almost twice those of non athletes i.e. around 1.6-1.7g/KgBW. It is interesting to note that appropriate training strategies would increase the body's efficiency of protein utilisation and thereby reduces the protein requirements too. Ingestion of 20g of protein 5-6 times a day has been

The protein needs of endurance athletes are lower than those of strength athletes i.e. 1.4g/Kg/d.

Consumption of protein supplements is very common among athletes especially strength athletes for maintaining higher muscle mass.





**Requirements of fat:**

Athletes should never consume less than 20% of total energy from dietary fat as it is a concentrated source of energy and also help them perform the exercise for longer duration. Fat is an important source of energy for activities <70% VO2max of intensity. Besides providing energy, fat is required for absorption of fat soluble vitamins and maintenance of cell membranes etc. Athletes need to consume 20-35% of total energy from fat with equal amounts of energy from SFA:MUFA:PUFA.

Overall, macronutrient intake of athletes is influenced by the duration of exercise activity as shown in Figure-1.

**Micronutrient needs of athletes**

Micronutrients are required by athletes for efficient metabolism of macronutrients, prevention of oxidative damage, maintenance of

haemoglobin etc. Since requirement of B vitamins is dependent on energy intake, athletes with higher energy needs require higher amounts of these vitamins. Similarly, athletes experience higher level of oxidative stress and hence higher intake of antioxidant nutrients (Vitamin C, Zinc, Copper and Selenium) would be beneficial. Several athletes especially female endurance athletes suffer from nutritional anaemia thereby it is very important to meet the requirements of iron, folic acid and vitamin B12 to prevent the same. Though many athletes prefer micronutrient supplements, regular consumption of micronutrient rich foods including fruits, vegetables and whole grains would be sufficient to meet the micronutrient requirements unless athletes experience clinical symptoms of deficiency.

**Hydration**

Hydration is considered



equally or even more important than food for sports persons. Thirst should never be considered an indicator of fluid need among athletes. Mild dehydration reduces the sports performance, and severe dehydration could be even fatal. Hence, fluid intake as per recommendations is mandatory. The optimum fluid intake recommended by American counsel of Sports Medicine (ACSM) is 400-800 ml/hour. Individualised hydration plan is necessary for athletes that would consider the type, duration and intensity of activity while recommending the volume and composition of fluid. Heavy weight category athletes competing in warm climate need to consume more fluid at a faster rate than light weight athletes.



Figure-1: Nutritional needs of athletes based on duration of activity

|   |               |         |
|---|---------------|---------|
| <b>Short-duration activity</b><br>(Around 4 minutes)<br>          | Carbohydrates | 60%     |
|   | Fat           | 15%-25% |
|   | Protein       | 15%-25% |
| <b>Intermittent-duration activity</b><br>(Around 4-9 minutes)<br> | Carbohydrates | 55%-60% |
|   | Fat           | 15%-20% |
|   | Protein       | 15%-25% |
| <b>Long-duration activity</b><br>(More than 10 minutes)<br>       | Carbohydrates | 60%-70% |
|   | Fat           | 15%-30% |
|   | Protein       | 15%-25% |



muscle damage should be a priority for an athlete to avoid post exercise stress. A period of up to 3-4 hours post exercise is regarded as 'window of anabolic opportunity'.

Interestingly, overhydration is equally dangerous to sports persons as it dilutes the blood leading to low sodium levels in blood (hyponatremia). An individualised plan for Sodium is considered equally necessary for athletes. Athletes who sweat more, exercise in warm climates at high intensity for longer duration require more sodium. Consumption of a sports drink containing 30 mmol/L (230-690 mg/L) of sodium prevents hyponatremia in athletes. Some sports drinks also provide sugars, amino acids, antioxidants etc., that would help to replenish glycogen stores, prevent muscle damage and/or facilitate quick muscle repair and prevent oxidative stress. Athletes should be trained to identify the onset of dehydration at the earliest.

### Recovery Nutrition:

High intensity and/or long duration moderate intensity exercise damages the skeletal muscle which needs to heal as quickly as possible. Athletes should be provided with protein and simple carbohydrate rich food soon after the exercise in order to prevent extensive muscle damage and also to manage fatigue. Timely recovery from

Consumption of high amount of simple and easily digestible carbohydrate (1.2g/KgBW/hour) along with good quality protein or amino acid supplements (Leucine) every 15-20 minutes till 3-5 hours after exercise is suggested by the ACSM.



### Supplements (brief overview):

Though supplements are not considered crucial for success in sports, athletes consider them a boon to boost their performance. Nutritional supplements include proteins, amino acids, Creatine, Carnitine, antioxidants etc. Besides these, caffeine, nitrates, probiotics are also consumed by many. Consumption of supplements as per the dosage recommendations is very essential to avoid adverse effects. Nutritional supplements are required for those

athletes with nutritional deficiencies. However, excessive intake of supplements should be avoided.

### Nutritional problems of athletes:

Lack of nutritional awareness, Inappropriate dietary and supplementation strategies, fad diets, Faulty weight management practices, issues with food availability for travelling athletes often result in several

nutritional problems such as nutritional anaemia, deficiency of B vitamins, Calcium etc. Hence it is very essential to create awareness among athletes on the appropriate use of supplements and food based approach towards maintaining optimum nutritional status.

### Conclusion:

Nutrition is one of the major influencing factors of sports performance. A nutritious diet planned as per the type, intensity and duration of sports activity supports training and contributes to health, fitness and successful performance among athletes.



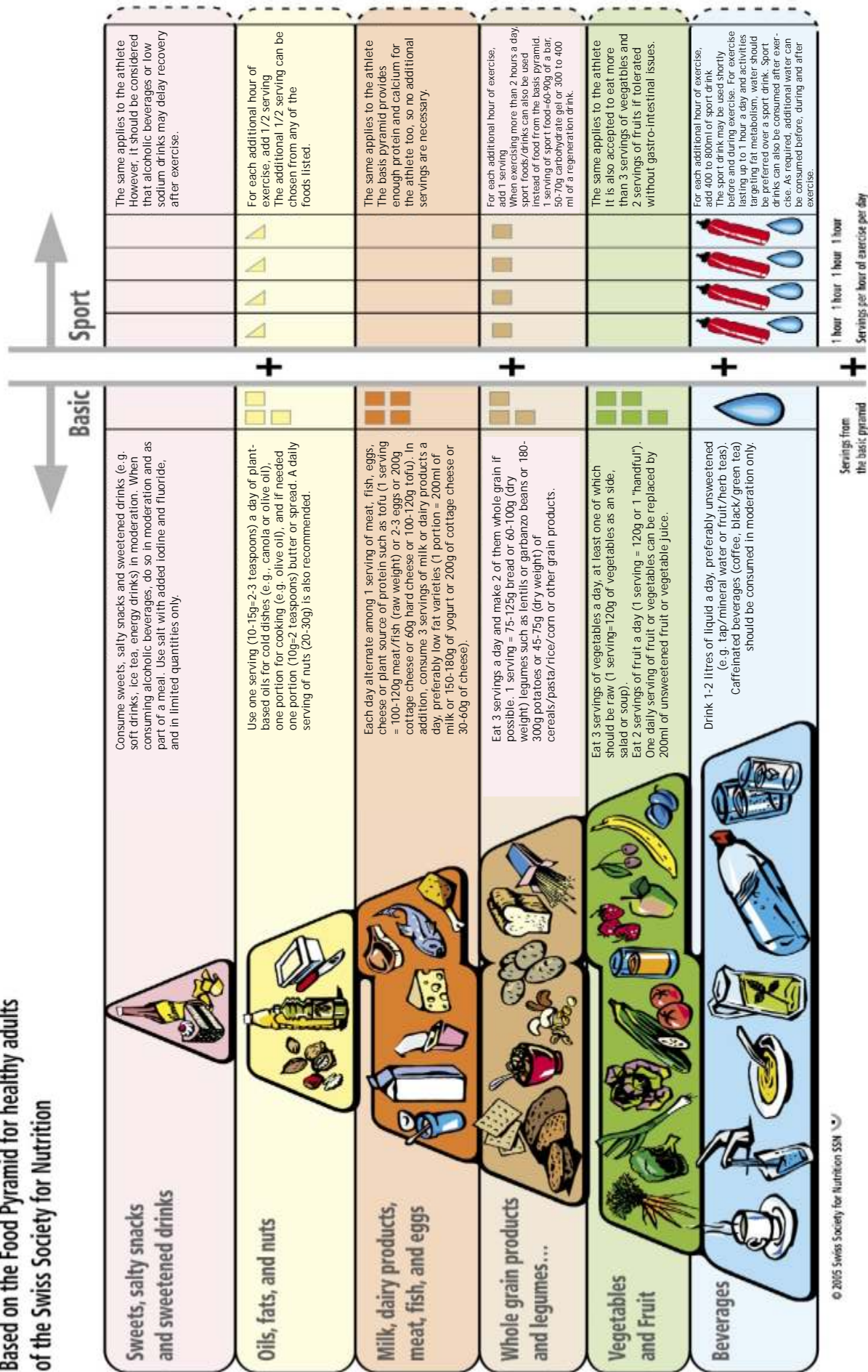
Figure-2: Dietary guidelines for athletes exercising more than 5 hours per week

# Food Pyramid for Athletes

<https://www.nestle.in/nhw/nutrition-for-runners-good-reads/special-nutrition-requirements-for-athletes>

For athletes exercising  $\geq 5$  hours per week

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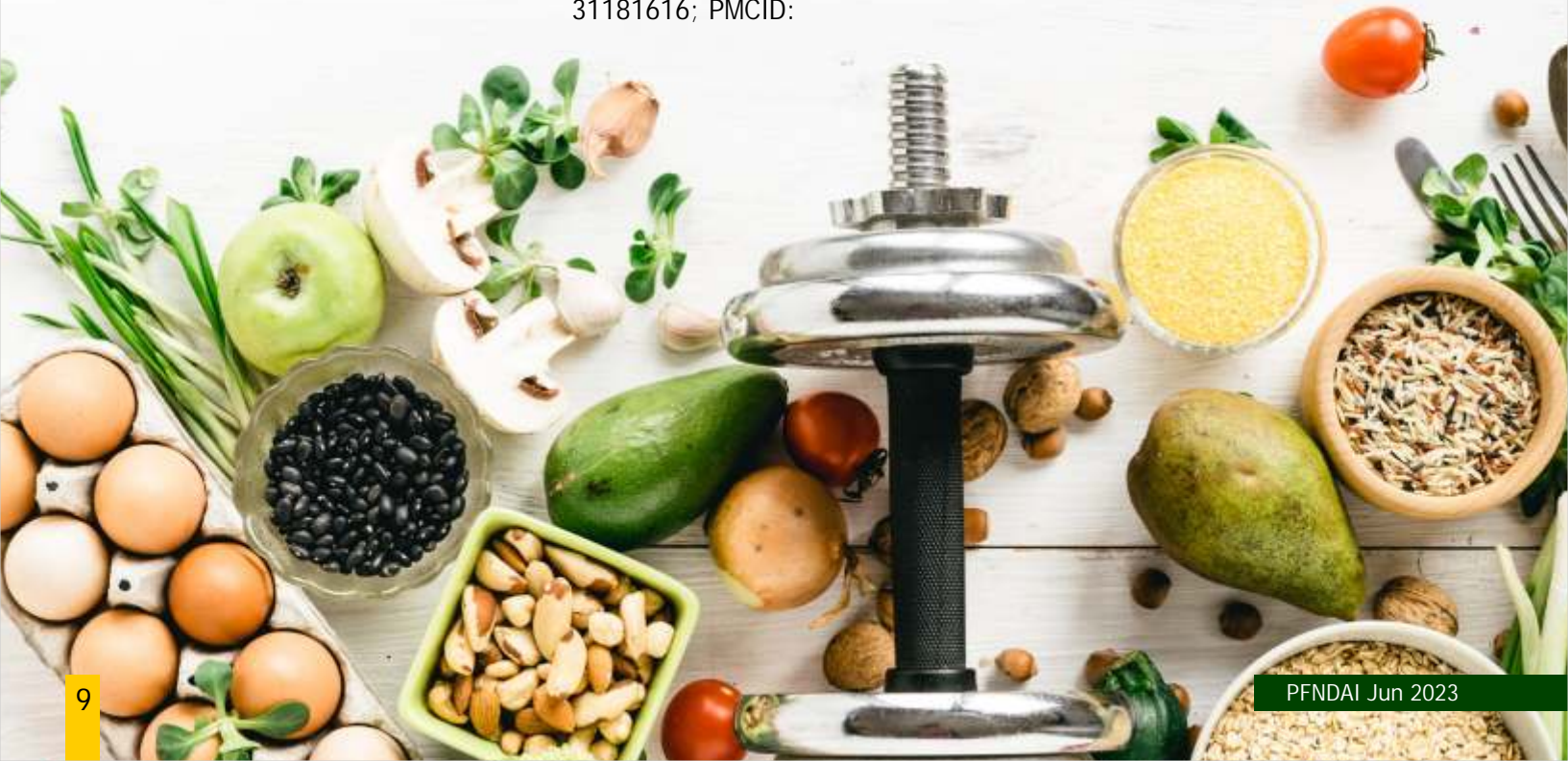
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# MILK ALLERGY & APPLICATIONS OF ENZYMES:

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Allergy to milk is immune system response to milk and products having milk in them. This is very common food allergy among children. Although cow's milk is the most common cause, milk from sheep, goats, buffalo and other mammals can also cause a reaction. (Mayo Clinic, 2022)

Symptoms of allergy range from mild to severe reaction soon after consumption of milk. They may include wheezing, vomiting, hives and digestion problems. It can also cause anaphylaxis, which is a severe life-threatening reaction. Fortunately, milk allergy is outgrown by most children but until then they should avoid milk and dairy products.

Cow's milk protein allergy appears most common. Milk allergy seems to affect about 2 to 3% of babies and young children (Lifschitz & Szajewska, 2015). To reduce risk, recommendations are that babies should be exclusively breastfed for at least 4 preferably 6 months,

before introducing cow's milk or soy infant formula may be considered, but some babies would also be allergic to soy.

There is scant data on this from India and with less awareness among paediatricians about its diagnosis and management, leads to improper diagnosis. Prevalence of allergy including CMPA among Indian children has not been studied epidemiologically but some hospital studies report it as

cause of malabsorption syndrome in 6% children of all ages (Matthai et al. 2020)

Three percent infants in India are reported to suffer from cow's milk allergy, causing diarrhea and vomiting. Health professionals state that studies about problem among infants show that out of 25 proteins in cow's milk, four cause the allergy. Government has allowed hydrolysed protein and amino acid formula milk in market. (Garari 2017)



considered good choice for infant formula and dairy products. Caseins, beta-lactoglobulin and alpha-lactalbumin along with minor proteins bovine

serum, and lactoferrin are all major allergens and are capable to induce allergies. Reducing the allergenicity thus is a major challenge (Liang et al. 2021).

### Different Processes Used to Lower Allergenicity

Cow milk proteins including beta-lactoglobulin, alpha-lactalbumin and caseins are among antigens first experienced by children. The allergy is the adverse reaction through immunological mechanism. Although avoidance of cow's milk is effective means to prevent the allergy, avoiding it will create nutritional deficiency and may affect children's healthy growth. Alternatively, processing can prevent and eliminate the allergy and some processes that have been used include heat treatment, glycation reaction, high pressure, enzymatic hydrolysis and lactic fermentation. (Bu et al. 2013)

During heating, denaturation, aggregation and chemical reaction with other substances takes place, resulting in changes in allergenicity. Some proteins like casein are more heat stable than globular whey proteins, so it is easier to denature and reduce allergenicity of whey proteins than casein.



Conjugation of beta-lactoglobulin with carboxymethyl dextran improves emulsifying property, enhances thermal stability and reduces allergenicity. High pressure processing causes some changes in milk proteins like denaturation and aggregation. This also affects the allergenicity.

### Enzymatic Hydrolysis

Proteolysis can destroy the allergenic molecule by breaking down protein into small peptide molecules that do not have allergenicity (Heyman 1999). Proteolytic enzymes are derived from animal, plant and microbial sources of which food-grade ones could be used to prepare low-allergenic milk proteins.

Hydrolysis of whey protein concentrate with alcalase reduced the antigenicity when optimum pH, temperature and enzyme-substrate ratio were used (Zheng et al. 2008).

### Milk Allergy (Mayo Clinic, 2022)

This is an immune system response to milk as well as products having milk. It is a very common food allergy among children which sometimes may be carried into adulthood. While cow's milk is most common, milk from other mammals like sheep, goat, and buffalo can cause allergy. Allergy reaction starts soon after consumption of milk and causes wheezing, vomiting, hives & digestive problems  $\pm$  and/or anaphylaxis, a severe reaction. Avoiding milk is the primary treatment. Most children outgrow milk allergy. Allergy differs from milk protein intolerance which may cause digestive problems like gas and diarrhea. Allergy is caused by immune system malfunction which sees some milk protein as harmful and forms antibodies to neutralise it. This causes release of histamines that cause allergic symptoms.

### Cow Milk

Cow milk allergy is among most common food allergies that affects from 2 to 7.5% people globally. It is also most common food affecting about 1 to 2% infants showing mild to severe reactions. Cow milk is one of the most important foods for humans and is rich source of proteins, lipids, lactose and minerals, so is





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making low-allergenic preparation for infants. (Ghosh et al. 2017)

Although, whey proteins are quite useful when made hypo-allergenic,

Extensive hydrolysis of casein may be useful to produce safer protein hydrolysate although they may have lesser taste and nutritional quality. (Terheggen-Lagro et al. 2002)

As globular proteins are easier to denature and further hydrolysed to lower the antigenicity, whey proteins with low allergenicity were prepared and even marketed (Exl 2001). Since both denaturation and enzymic hydrolysis work to reduce allergenicity, partial hydrolysis of whey protein is enough with heat denaturation to lower allergic reaction. This not only improved the taste but also nutritional quality.

Whey is produced when cheese is made and it contains about 1% whey protein along with lactose. This could be utilised for healthy low-allergenic beverage. Both protein and lactose were hydrolysed, protein with protease from *Aspergillus oryzae* which have both endo- and exopeptidases. When enzyme was used at 0.05% of whey and reacted for 30 min at 50°C at neutral pH. Lactose was hydrolysed using beta-galactosidase of *A. oryzae*. This could be an effective way to produce a healthy low-allergenic beverage or the hydrolysed proteins could be used for

when considering the total proteins of cow milk, casein is the major protein, being 80% of total protein. Thus if it is possible to convert all proteins by enzymes to hypo-allergenic, there would be much more of it available. However, there is a problem with casein as mentioned above that since it is not easily denatured by heat, it is more difficult to make less allergenic.



Enzymatic hydrolysis is accepted as safe. Some proteins are destroyed and peptide and disulphide bonds are broken. This changes the conformation and sequence in epitopes, which is responsible for allergy. Changes in epitopes decreases allergenicity so proteins become hypo-allergenic.

Liang et al. (2021) used

combination of alcalase, protamex and flavourzyme and added to preheated skim cow milk and after the reaction, heating at about 100°C for termination of reaction. The allergenicity was reduced up to 86.55%, thus effectively reduced immuno-reactivity of cow milk. Although there were changes in taste, colour and flow behaviour of the milk, it provided good foundation for developing high-quality hypoallergenic nutritious dairy products.

### Conclusions

Cow's milk allergy is very common and it deprives children and adults a very nutritious food. There are many ways in which the allergy could be reduced. Some of the methods like denaturation with heat are not very effective on all milk proteins. Combination of different processes have been tested and enzymatic hydrolysis sounds very attractive as it breaks down the allergenic epitopes to make them ineffective. Use of multiple enzymes on total proteins of cow milk has shown a lot of promise to prepare nutritious and tasty hypoallergenic product. The present use of whey proteins only utilises part of the milk proteins. If entire protein content could be converted hypoallergenic it would be quite useful.





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# SHELF-LIFE STUDIES



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Preserving foods for the extended periods has been the desire of human beings from ancient times. Salting, drying (sun or air), pickling are a few techniques used for time immemorial to preserve the foods. With advancement of science and technology, there has been development of different methods of preservation such as Canning, Drying, Freezing, Chilling, Radiation, High pressure etc. Also, there are developments in analytical techniques, microbiology, and biochemistry. Combination of these lead to a better understanding of spoilage of foods and how methods of preservations can be adopted to develop Food Products of right quality which include

physical, chemical, or sensory attributes of the product. Understanding of microbiology helped to design a safe product.

Although metal containers and glass were early packaging materials, newer flexible packaging materials and understanding of modified atmosphere has provided tools of developing products of choice for Food Scientists. Developing new products is future and very vital for the growth of any organisation. Food product development is very complex process for any organisation involving multidiscipline. This is systematic process right from concept to commercial launch. The formulation development is the most important part of Product Development, in which Shelf-life determination is the key step.

Shelf life of food is the period until which the product remains safe to consume and acceptable to quality in the recommended conditions of storage. Shelf life assures

safety and quality also helps developing consumer confidence. Shelf-life declaration of the product is regulatory requirement of every country. We need to understand terms like "Best before" or "Use by/ Expiry" date. "Best before" means the product will be safe to consume but may not be of assured quality, whereas in case of "Use by/ Expiry," it will not be microbiologically safe to consume. In India, as per Food Safety and Standards (Labelling and Display) Regulations, 2020, "Use by/ Expiry" is mandatory to declare on labels. "Best before" can be additionally declared and is optional.



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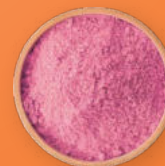
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Shelf-life studies must be determined for the product, which is correctly processed, packed and stored under desired conditions. It is important to understand the product before conducting shelf-life studies. The products can be classified in three main categories: 1) highly perishable (milk, fresh meat, fruits, or vegetables) which have short shelf life because of microbiological and enzymatic degradation. 2) Semi perishable (pasteurised milk, smoked meat, cheeses, and some bakery products) may have short to medium shelf life, which have received minimum preservative treatment. 3) Highly stable foods (Canned Frozen or Dried Foods). These are medium to long-range shelf-life products, which have received thermal treatment or are stored in specific conditions. Period of shelf-life testing duration differs according to category of the product.

While developing protocol for shelf life testing, it is important to know the factors responsible for stability of the product under development. There are intrinsic factors such as food composition, water activity, pH, available oxygen, nutrients, available microflora, biochemistry of product (enzymes, chemical reactants), and use of preservatives (chemical or

salt) in the product. As the product must survive and to be stable through the shelf life (storage, transport, handling) external factors such as light, humidity temperature, head space in the product are to be considered. For example, if the studies for a product are carried out at 4°C and actual storage maintained is 8°C, there will overestimation of shelf life. Stability of the product depends on the quality of ingredients/additives used, method and hygienic status of processing, packaging and conditions throughout the distribution chain.

While setting up shelf-life testing, different parameters are defined, which include, microbial parameters, physical and chemical parameters, nutritional considerations, and sensory attributes. Microbial parameters are of paramount importance as they are directly related to the safety of the product. Total microbiological count is set to lower limit when the product is meant for vulnerable groups like infants or elderly. Common pathogens and microbial toxins such as aflatoxin are to be tested depending on the product. The microbiological requirements are guided by local regulations, which are minimum requirements. Physical characteristics like moisture loss or gain, staling, rancidity, change in appearance, and change in viscosity, which indicate product quality, are part of the shelf-life testing protocol. Nutritional testing is another

important thing to be included in protocol. This will include macro and micronutrients. This is also regulatory requirement and if claims are made on some nutrients. Consumers relate the product to its sensory characteristics. Therefore, attributes like colour, texture, flavour, mouthfeel are very important. Sensory testing is generally done by a trained panel. Most of the parameters mentioned in shelf life testing protocol, are part of the product specification and are developed along with methods of analysis in the early formulation development stage itself. Packaging also plays important role in shelf-life stability in many ways. Oxygen or moisture transmission property can influence stability of the product packed. Sometimes, the air in the headspace of the pack is replaced by Carbon dioxide or Nitrogen to improve stability of the product. This helps extending shelf life many ways. Reduced oxygen levels inhibit growth of aerobic organisms; also many oxidative reactions such as rancidity are retarded. That is why in such cases, measurement of Oxygen level in headspace is part of test protocol, where Carbon dioxide or Nitrogen are used to replace. Generally, the oxygen level is reduced to 2% in the headspace.



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Shelf life testing is carried out at a particular storage condition. For example, for frozen products it is - 18°C or lower, for chilled products it could be 0 to 5°C or maximum up to 8°C. For the products manufactured and sold in temperate zones it is 25°C. In Tropical regions, it will be 38°C. Controls are kept at ambient temperatures.

Sampling schedule depends on the typical shelf life. For short shelf-life products, samples are studied at daily intervals for a week. For medium shelf life, products are kept for three weeks with samples to be tested at the intervals of 7, 14, 19, 21 and 25 days. In case of products with long shelf life (one year or more), samples drawn at monthly intervals or at 0, 1, 3, 6, 12, 18 months. In case of processed foods, samples from at least three scale-up batches are drawn, which will take care of processing variations. Samples are tested for micro, physical, chemical, and sensory as per the stability protocol. All the parameters are tested at zero time. However, at other intervals it is not necessary to test all the parameters. For example, parameters like, Protein, Fat, Ash is not expected to change. Shelf-life evaluators judiciously decide about the protocol as each

testing costs, time, and money. Most important thing to remember is sensory test should not be carried out before microbiological analysis in view of safety.

Accelerated shelf-life studies are also carried out where samples are exposed to harsher conditions like higher temperature and humidity. In such a case, there will be an early indication about the nature of spoilage of the product. Classical example for this is accelerated shelf life is testing of edible oils, which are added with antioxidants. In this case, shelf life testing at ambient temperature will be very time-consuming process. Samples are exposed to higher temperatures and oxygen is bubbled through. Under these accelerated conditions, samples are drawn at various time intervals to check rancidity by chemical analysis as well as sensory. Shelf life can be extrapolated by mathematical model when the early rancidity is detected. Similarly, for frozen products the acceleration can be done by increase in storage temperature. However, the prediction may not be very accurate in case of products with multiple ingredients and parallelly studies until end of shelf life are conducted.

Proper shelf life testing is important step in product development process, which gives confidence to organisations about the safety and quality of the product before its launch. This also ensures that customer gets the product of the assured quality, which is described, on the label. These studies can also act as an important tool for any product modification or packaging development project.

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[https://www.fssai.gov.in/upload/uploadfiles/files/Comp\\_La\\_belling.pdf](https://www.fssai.gov.in/upload/uploadfiles/files/Comp_La_belling.pdf)



Cheese has become an integral part of the diet across the globe. Cheese can be had in its natural form or in the processed form as spreads in sandwiches, toppings in pizzas and pastas, which have now become hot favourites across all age groups.

Cheese is a ripened or unripened milk product made by coagulation of milk, which is brought about by action of rennet or any other coagulants. (1). In India microbial rennet is used in the cheese making process.

During the cheese making process water is removed, fermentation by lactic acid bacteria takes place and salt is added all of which increase the shelf life of the cheese formed. Cheese is a nutrient dense dairy product as it is a good source of proteins and fats, though their content may vary according to the cheese variety. Most cheeses are good sources of Vitamin A, riboflavin, Vitamin B12, traces of folate and Vitamin C may also be present. Cheese can also be considered as a valuable source of Calcium, phosphorous and magnesium.

Numerous varieties of cheese are available in the market, which differ in size, shape, colour, hardness, texture, odour and taste. Following steps will be common for making any variety of cheese: (2)

# CHEESE AND PROCESSED CHEESE PRODUCTS

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- **Procurement of milk-** Milk from mammals like cow, buffalo or goat can be used for cheese making. In India, cheese can only be made from cow milk, buffalo milk or a combination of the two milks as per FSSAI.

- **Souring-** Specific strains of bacteria are added to the milk which results in acidification as lactose is converted to lactic acid. Starter cultures help in bringing the pH of cheese milk to a desirable range and also help in flavour development of cheese. *Lactococcus lactis* subsp. *lactis* or *cremoris*, *Streptococcus salivarius* subsp. *thermophilus*, *Lactobacillus delbrueckii* subsp. *bulgaricus*, *Lactobacillus helveticus* are the typical starter cultures used.

There are also some adjunct starters that are added to accelerate the ripening, to impart certain specific

properties and also to enhance their taste profile. (National Institute of Health). Here are some examples of common adjunct cultures: *Lactobacillus casei* and *Lactobacillus plantarum* for flavour in Cheddar cheese, *Propionibacterium freudenreichii* for eye formation in Swiss cheese *Brevibacterium linens* can be used as a smear for smearing the outside of cheeses like Gruyere, Brick and Limburger cheeses.





Yeasts and moulds can be used to give typical colour and flavour, Torula yeast is used in the ripening of Gruyere, Brick and Limburger cheeses. Penicillium camemberti in Camembert/Brie, and Penicillium roqueforti in Blue cheeses, are examples of moulds.

- **Clotting-** For cheeses rennet is added after starter bacteria addition. Rennet contains an enzyme chymosin, which speeds up the coagulation of casein and produces a stronger curd. Rennet set cheeses are firm.

- **Cutting or breaking coagulum-** A portion of water is removed by cutting, cooking, stirring or draining the curd or by mechanical application of pressure. The curd forms a mat.

- **Consolidation or matting of curd-** The curd mats are cut into sections and piled on top of each other and flipped periodically. This step is called cheddaring, which helps the mats to "knit" together and form a tighter matted structure. The curd mats are then milled (cut) into smaller pieces.

- **Maturing-** Cheese thus obtained may or may not be ripened depending on the variety.

Unripened cheese can be consumed shortly after manufacture while ripened

cheese must be held at a particular temperature and certain other conditions for texture and flavour development depending on the cheese variety. Mould ripened cheese is a cheese where ripening happens by the development of characteristic mould growth through the interior or on the surface of the cheese.

Certain flavourings like herbs spices pepper, port wine may be added to the different varieties of cheese. The other miscellaneous additives that may be added are calcium chloride (to improve the coagulation properties of the cheese milk), common salt (for taste and also to improve the shelf life), annatto or  $\beta$  carotene (to give a uniform yellow colour to the cheese). Sometimes transglutaminase enzyme is used in certain cheese varieties to improve their yield.

Numerous cheese varieties are available in the market globally. They are classified based on the following parameters: (3)

**The type of milk-** Most of the cheese are made with cow's milk. Roquefort and Pecorino Romano are European cheeses made with goat and sheep's milk.

**Type of coagulation-** Cheddar, Gouda, Mozzarella, Swiss, Blue, Camembert are rennet coagulated and Cottage cheese and Quark are acid coagulated.

**Firmness of cheese-** Cheese can be classified as **semi soft**,



**medium hard or semi hard and hard cheese.** Hardness depends on the moisture content, which depends on the pressure with which it is packed in moulds and also the ageing time. Havarti, Munster and Port Salut are semi soft cheese. Gruyere, and Gouda are medium hard cheeses and are ideal for melting and are often served on toast for quick snacks or simple meals.

Hard cheese contains lower moisture content and are packed into moulds under greater pressure and aged for a longer time than the soft cheeses. Cheddar cheese is an example. Examples of hard cheese varieties that are also called "grating cheeses" are Parmesan and Pecorino Romano. Natural cheese that have high moisture content and are not aged are called fresh cheeses examples are cream, cottage cheese. Paneer is also an example of fresh cheese.

**Brining /Pickling of cheese-** These cheese types are popular in Mediterranean and Middle Eastern countries where the cheese is left for maturation in brine solution in an airtight or semi permeable container. They are mostly white and rind less. Feta, Halloumi, and Serene are some examples.





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**Mould used for ripening- Soft ripened mould cheeses** are aged by exposing them to moulds such as *Penicillium candida* or *P. camemberti*. Examples are Brie and Camembert.

**Wash rind mould cheeses** are washed periodically with brine solution or mould bearing agents like beer, wine, brandy to help the growth of mould species *Brevibacterium linum*. Limburger and Appenzeller are examples.

**Smear ripened mould cheeses-** Some washed rind cheeses are smear ripened with solutions of bacteria and fungi like *Brevibacterium linum*, *Debaryomyces hansenii*, *Geotrichum candidum*. Munster and Port Salut are examples.

**Blue mould cheese-** It is made by inoculating cheese with *Penicillium roqueforti* or *Penicillium glaucum*. The cheese develops distinct blue veins, Roquefort, Gorgonzola and Stilton are some examples.

**Cheese Analogues-** They are made from casein powder known as rennet casein and a source of fat either butterfat or usually vegetable oil. These cheese like products are mainly used in consumer ready meals. In India, **Gourmet cheese** is a trend that is catching up, some

of these cheeses mentioned above are being produced as artisanal cheese in our country, Cheddar, Mozzarella, Gouda, Brie, Swiss, Feta, Gruyere, Ricotta are a few of them. India is also home to delicious indigenous cheese varieties besides paneer, Kalimpong, Bandel and Chhana (from Bengal), Churu and Chhurpi (from the Himalayan regions), Kalari (from Jammu Kashmir).

The cheeses seen so far are all natural cheeses, but are these cheeses used as dressings on pastas and pizzas? They are slightly different, most of these appetizing dishes use processed cheese.



#### What is Processed Cheese? (4)

"Processed Cheese" means the product obtained by grinding, mixing, melting and emulsifying one or more varieties of cheeses with the aid of heat and emulsifying agents. It may contain cream, butter, butter oil and other milk products subject to maximum 5.0 percent lactose content in the final product and edible common salt, vinegar/ acetic acid, spices and other vegetable seasoning and foods other than sugars properly cooked or prepared for flavouring and characterization of the product provided these

additions do not exceed one sixth of the weight of the total solids of the final product on dry matter basis and cultures of harmless bacteria and enzymes. It shall have pleasant taste and smell free from off flavour and rancidity.

#### How is processed cheese prepared? (5)

First step in making processed cheese is selection of ingredients and preparation of formulation. In addition to natural cheese and emulsifying salts other ingredients like colours, flavours, spices, food gums, mould inhibitors are also employed. To get a processed cheese with desired properties the choice of natural cheese and emulsifying salt has to be done appropriately.

Next step is grinding and mixing where the natural cheese is broken into chunks in a grinder, primary caseinates, whey protein concentrates and skim milk may also be added to improve the quality and stability. Depending on the fat content of the final product a fixed ratio of a mixture of butter and water is added along with salt, emulsifying salts and other miscellaneous ingredients.

This is followed by melting and pasteurization where the cheese blend is transferred to cookers which have sharp rotating blades and simultaneous heating and shearing is carried out to produce a homogenous fluid. Heating helps in pasteurizing the cheese blend.



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refrigeration temperatures. The final product is stored under 10 C but freezing should be avoided to prevent formation of ice crystal.

Cheese may have health benefits like helping develop bone/ teeth strength, lowering blood pressure, boosting healthy gut microbiota but at the same time may trigger cardiovascular issues due to saturated fats that it contains and also due to its elevated salt content. Consumers should make an intelligent choice and choose food items from different sources appropriately and make them a part of their regular balanced diet.



Final step will be hot packing and cooling where the cheese blend from cooker is transferred to packaging machines. Processed cheese can be packed in lacquered foil, tubes, cups, cans and cardboard cartons. It can also be packed as slices. The body of the finished product may vary from firm and sliceable to semi-soft and spreadable, depending on the blend formulation, processing conditions and the cooling rate. The product that is cooled slowly develops a firmer body as compared to the product that is cooled faster. Thus, the processed cheese should be cooled as slow as possible while in the case of processed cheese spread fast cooling is required.

**Cheese powder** can be prepared by drying the cheese to prolong the keeping quality and to reduce the weight and bulk. Cheese powder can be used in a variety of foods like biscuits, savoury, snacks, soups, bakery, sauces, dressings, ready meals and processed cheese. Hard cheeses like Cheddar and Parmesan are mainly used to produce cheese powder. (2)

Processed cheese has certain technical advantages over natural cheese, like extended shelf life, meltability, uniform texture and physical behaviour.

Since it can be mass produced it reduces the cost for the producer as well as consumer, there is a steady supply and also takes lesser time to produce when compared to traditional cheese making process.

Due to its meltability it is used in several food products. Nutritionally, processed cheese may not differ much from natural cheese but it cannot match the flavour of natural cheese. Amount of salt added in processed cheese may be double that of natural cheese along with addition of emulsifiers and preservatives.

#### Cheese market in India (6)

The cheese market in India size reached INR 71.3 Billion in 2022. Looking forward, the market is expected to reach INR 262.6 Billion by 2028.

Cheese is majorly used in fast foods like pizzas, burgers, sandwiches but off late they are being incorporated even in traditional foods like dosa, uttapams, roti rolls etc.

Lot of awareness is being created about nutritional benefits of cheese through advertisements in newspapers and social media. Numerous global players are also showing interest to invest in the Indian cheese market and with Indian entrepreneurs taking up artisanal cheese manufacturing, the future of cheese market in India is looking bright.



**Processed Cheese spread** is similar to pasteurized processed cheese except that an edible stabiliser is added and has a higher moisture permitted (~60%). This helps in smooth spreading at



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# COMING EVENTS

Bakers Technology Fair 2023  
July 05-07, 2023  
Coimbatore  
Info:  
[www.bakerstechnologyfair.com](http://www.bakerstechnologyfair.com)

5th International Conference on Food Nutrition Health & Lifestyle 2023  
July 27 - 27, 2023  
Kuala Lumpur, Malaysia  
W: <https://nutritionconference.co/>

14th Edition India Foodex 2023  
Aug 25 - 26, 2023  
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Anutec International FoodTec India  
Sep 07 - 09, 2023  
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# ONLINE REVIEWS

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Covid 19 was the worst pandemic in the human history faced in recent times. No ways to proper investigative techniques, no probable solutions in sight, there was fear for unknown in which everyone was groping to find solutions. There was lock down, social distancing norms, observance of strict hygiene including wearing masks. Life virtually came to standstill. But humans are amazing and as per Darwin's theory of "survival of fittest" they slowly adopted and found new ways of living. There was also positive impact of this pandemic and lockdown. There were positive side effects on environment like

improvement in water and air quality. People who were suffering from "work life balance issues," understood the importance of living with family in the difficult period. People also realised importance of hygiene, immunity and eating healthy foods.

There was paradigm shift in people's thinking about, physical and mental health, social interactions, cashless transactions, supply chain and e-commerce. The average online purchase prior to pandemic was 33% in developing countries, which increased to more than 60% at onset of pandemic. There was surge and turn around for e-commerce business. Many social media platforms collaborated with e-commerce

platforms so that they can give information on online products. Many e-commerce platforms were created to cater variety of consumer needs right from groceries, medical supplies, beauty products as well as apparels. People started looking for platforms who offer wide range of products in one place. In India, even local brands started competing with international brands. As per 2021 report, e-commerce is expected to grow 84% in the next four years.





reviews, as they would trust personal recommendations. Customers spend more time on

looking for product is useful tool. Such efforts are beneficial for online sales. Decision making for online shoppers is complicated and they spend lot of time on reading and comparing reviews. These reviews aid in decision-making. At times, angered customers write negative reviews. This results in loss of sales and such customers and their complaints needed to be handled carefully.

As a consumer, there is major difference when it comes to purchase between offline and online. When one purchases off line one can see and compare products/ brands. Consumer when pays for the product, wants some assurance that he gets value for his money. We always want to know which is the best brand. For example, when we go for purchase of white good like television or refrigerator, even before going to shop, we seek opinion of our relatives/ neighbours about the best brand. The same psychology works when we do online purchase. For example, when we do book for a hotel on line, we mainly look for online ratings by other customers who visited it earlier. We want to know what others experienced. We prefer a place where star rating is highest. Therefore, when it comes to online selling, online product reviews are of prime importance.

retailers, which have positive reviews. Negative reviews are equally important. Research indicates users spend five times as long as on sites while interacting with negative reviews, with 85% increase in conversion rates. Online reviews are important for the online stores. Positive words have measurable impact on the sales.

Reviews come naturally by the customers. However, there are tactics, which lead to receive online reviews. Sometimes the reviews are asked. After purchase at the checkout page there could be pop up requesting feedback. Customers are more likely to give feedback if the process is



simple. For example, simple review submission form at the bottom of the website page so that customers can leave notes before leaving the web page.

In present web-based world, everyone wants to read online reviews. People believe the

Online product reviews play a major role for e-commerce businesses. As mentioned earlier, it is consumer psychology that they make judgement, decision to buy products based on collective actions of others. Therefore, online reviews are very important tool for driving sales. There are several brands in each category by e-commerce. Many new brands are added. An online review is only space the customer to know which the quality brand is.

Customers love gifts or free shopping. Therefore, incentivizing them by offering gift, discount on the next purchase etc for giving opinion, will be another way to receive reviews. Sending email to customer email after purchase to survey on various aspects like ease of navigation, check out process, speed of delivery, product quality can generate valuable feedback, which can be displayed on the site. Yelp, Google My Business are some of the good sites for the reviews.

Companies build customer trust and reputation based on the reviews. Search Engine Optimisation (SEO) process, in which more web traffic can be attracted for the customers







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Governments are proactive to protect consumers from this kind of problem. In India Department of Consumer Affairs set up

reviews are becoming very important with growing e-commerce in every field of life. Genuineness of the reviews is vital for consumers and e-commerce business. Standardization of whole process will help build trust of these reviews. Regulators are trying to protect the consumers by developing standard systems and mechanisms.

So far, we have seen how reviews are created. Consumers are benefitted if these reviews are authentic. However, there could be fake reviews. This could happen because some marketers create fake reviews. They attempt to create inflated star ratings by paying users for fake and inflationary ratings. Sometimes negative ratings are created for the competitors. It is better to be cautious when overwhelming number of overly positive reviews are appearing. Consumers start losing the trust on reviews, which is neither good for them nor for the companies. There are many ways to find the fake reviews. These could be poorly written reviews, lack of profile pictures, overly positive language. Sometimes cluster of reviews at the same time with same pattern are indicative of fake reviews. Manually sifting hundreds of reviews to detect fake reviews may be impossible task. Tools like Artificial Intelligence could provide solution for such problems.

a committee in June 2022 to check fake and deceptive reviews in e-commerce. These new guidelines will drive transparency as well as information accuracy for both business and consumers. With this for platforms like Google or Facebook go will require to validate real person behind the review through 6 - 8 specified mechanisms which means fake accounts created just for review writing will go away over time. Bureau of Indian Standards has issued a standard, "IS 19000: 2022, Online Consumer reviews - Principles and Requirements for their collection, Moderation and Publication". This standard provides requirements and recommendations for the principles and methods for review administrators to apply in their collection, moderation, and publication of online consumer reviews. The standard prescribes specific responsibilities for the review author and the review administrator.

To conclude, online product

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# REGULATORY ROUND UP



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Dear Readers,  
Following are  
notifications /orders  
after last Round Up.

[Applications received for approval of the products/ingredients formulated with vitamins and/or minerals above one RDA level.](#)

The order published on 15th May is regarding the applications received under Non specified Food and Food



Ingredients Regulations, 2017.

Expert committee on Non specified Food and Food Ingredients recommended that such products with Vitamin and Mineral above one RDA are more akin to drug products and may not be considered for approval.

Therefore, authorities decided that these products shall not be approved under Non specified Food and Food Ingredients Regulations, 1917. This will have repercussions on the new products developed where requirements of Vitamins and Minerals are higher than one RDA.

[Enforcement of FSSA, 2006 & Rules/Regulations made thereunder, in respect of the FBOs, having Central Licenses.](#)



This notification states that premises of FBOs having Central License can be audited only by Central Licensing Food Safety Officers. The State Food Safety Officers can audit independently only after taking the due permission.





[Notice dated 3rd May, 2023 for Seeking public comments on recent recommended manuals by Scientific Panel on Methods of Sampling & Analysis \[Uploaded on : 03-05-2023\]](#)

Two manuals for methods of sampling and analysis (Honey and other beehive products and Microbiological Examination of Food and Water) are approved by scientific panel. These are circulated to stake holders for comments/ views/ suggestions in prescribe format. (Do not know whether this is relevant for us)

[Direction under Section 16 \(5\) of Food Safety and Standards Act, 2006 regarding re-operationalisation of Food Safety and Standards \(Foods for Infant Nutrition\) Amendment Regulations, 2022 relating to revised limits of Selenium, Manganese, Iron and](#)

[Biotin](#) Revision of limits of Selenium, Manganese, Iron and Biotin was operationalised under FSS(foods for Infant Nutrition) Amendment Regulations, 2022 from 18th October 2022. As the draft of FSS(foods for Infant Nutrition) Amendment Regulations, 2022 are under the process of Gazette notification and may take some time, it is decided to re operationalise these limits from 1st April 2023.



[Draft notification amending FSS \( Alcoholic Beverages\) 2018 has been published.](#) Following alcoholic beverages have been defined. 1) Mead (Honey wine), 2) Craft beer, 3) Indian liquors, 4) Low alcoholic beverages/RTD, 5)Wine based beverages, 6) Country liquors

[Direction under Section 16 \(5\) of Food Safety and Standards](#)



[Act, 2006 regarding enforcement of the Food Safety and Standards \(Labelling and Display\) Second Amendment Regulations, 2022](#)

This second amendment published on 22nd October 2023 with enforcement date of 1st May 2023. This was about declaration of warning statement on "Pan Masala" should cover 50% of FOP. Representation was received to extend the date to exhaust packaging materials. In view of this authorities have extended the date for the period of three months from the implementation date of 1st May 2023.



# RESEARCH IN HEALTH & NUTRITION

## New form of omega-3 could prevent visual decline with Alzheimer's disease

Science Daily March 28, 2023

The DHA found in fish oil capsules and other supplements is typically in a form called triacylglycerol (TAG) DHA. Although TAG-DHA has benefits in other parts of the body, it does not reach the eyes because it cannot travel from the bloodstream into the retina. For the study, researchers created a new lysophospholipid form of DHA, or LPC-DHA. In studies using mice, LPC-DHA successfully increased DHA in the retina and reduced eye problems associated with Alzheimer's-like processes.

"Dietary LPC-DHA is enormously superior to TAG-DHA in enriching retinal DHA and could be potentially beneficial for various retinopathies in patients," said Sugasini Dhavamani, a research assistant professor in the Department of Medicine at

the University of Illinois at Chicago. "This approach provides a novel therapeutic approach for the prevention or mitigation of retinal dysfunction associated with Alzheimer's disease and diabetes."

In healthy eyes, DHA is concentrated in the retina, where it helps maintain photoreceptors, the cells that convert light into signals that are sent to the brain. DHA deficiency in the retina is associated with vision loss. People with Alzheimer's disease, as well as those with diabetes, retinitis pigmentosa, age-related macular degeneration and peroxisomal disorders, frequently have abnormally low levels of retinal DHA, and visual impairments are common as a result.

While boosting DHA can help to prevent such declines, increasing retinal DHA content has been challenging with

currently available supplements. For a dietary supplement to deliver DHA to the retina, the DHA must be able to first be absorbed from the intestine into the bloodstream and then cross from the bloodstream into the retina.

"Increasing the retinal DHA at clinically feasible doses has not been possible until now because of the specificity of the blood-retinal barrier that is incompatible with the specificity of the intestinal barrier," said Dhavamani. "This study uses the novel approach of dietary LPC-DHA that overcomes both intestinal and blood-retinal barriers and improves retinal function."





The researchers tested their LPC-DHA supplement in mice bred to exhibit processes similar to those found in early-onset Alzheimer's disease. After six months, mice that were fed LPC-DHA daily showed a 96% improvement in retinal DHA content as well as preserved retinal structure and function. In contrast, TAG-DHA supplements had no effect on retinal DHA levels or function.

The results suggest that LPC-DHA supplements could help to prevent Alzheimer's-related declines in visual function. Researchers say the approach should also be helpful for other disorders in which DHA deficiency and vision impairment are common.

**A higher dose of magnesium each day keeps dementia at bay**  
 Science Daily March 23, 2023

The researchers say increased intake of magnesium-rich foods such as spinach and nuts could also help reduce the risk of dementia, which is the second leading cause of death in Australia and the seventh biggest killer globally.



The study of more than 6,000 cognitively healthy participants in the United Kingdom aged 40 to 73 found people who consume more than 550 milligrams of magnesium each day have a brain age that is approximately one year younger by the time they reach 55 compared with someone with a normal magnesium intake of about 350 milligrams a day.

"Our study shows a 41 per cent increase in magnesium intake could lead to less age-related brain shrinkage, which is associated with better cognitive function and lower risk or delayed onset of dementia in later life," lead author and PhD researcher Khawlah Alateeq, from the ANU National Centre for Epidemiology and Population Health, said. "This research highlights the potential benefits of a diet high in magnesium and the role it plays in promoting good brain health."

It's believed the number of people worldwide who will be diagnosed with dementia is expected to more than double from 57.4 million in 2019 to 152.8 million in 2050, placing a greater strain on health and social services and the global economy.

"Since there is no cure for dementia and the development of pharmacological treatments have been unsuccessful for the past 30 years, it's been suggested that greater



attention should be directed towards prevention," study co-author Dr Erin Walsh, who is also from ANU, said. "Our research could inform the development of public health interventions aimed at promoting healthy brain ageing through dietary strategies."

The researchers say a higher intake of magnesium in our diets from a younger age may safeguard against neurodegenerative diseases and cognitive decline by the time we reach our 40s.



"The study shows higher dietary magnesium intake may contribute to neuroprotection earlier in the ageing process and preventative effects may begin in our 40s or even earlier," Ms Alateeq said. "This means people of all ages should be paying closer attention to their magnesium intake. We also found the neuroprotective effects of more dietary magnesium appears to benefit women more than men and more so in post-menopausal than pre-menopausal women, although this may be due to the anti-inflammatory effect of magnesium."



## How fit is your gut microbiome?

Science Daily March 22, 2023

Exercise has many benefits -- strengthening muscles and bones, preventing disease and extending lifespan. It is also known to change the composition and activity of the trillions of microbes in our guts known as the microbiome.

It is well known that the microbiomes of athletes are different from those who are sedentary. This is not overly surprising according to the author and PhD student Shrushti Shah. "Athletes are often lean and follow strict diet and training schedules -- these factors alone can explain the different microbiomes of athletes," says Shah, a Kinesiology PhD student specializing in Nutrition, Metabolism and Genetics.

To investigate how exercise shapes the gut microbiota in non-athletes, the study assessed information on the type, time and intensity of exercise in relation to microbiomes in a large cohort of middle-aged adults. Information on body weight, diet and handgrip strength were also collected.

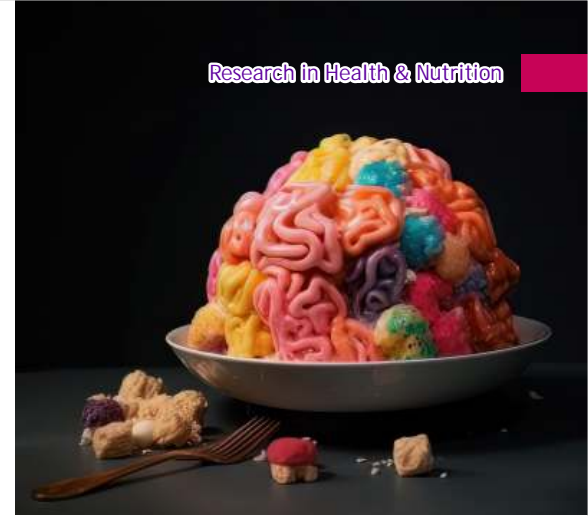
"Encouragingly, the study found that



physical activity of moderate duration (greater than 150 minutes per week) increased both the richness and diversity of the gut microbiomes compared to study participants that exercised less," says Jane Shearer, PhD, a professor in the Faculty of Kinesiology and the Cumming School Medicine. "Given this, more exercise appears to be important in improving microbiome health and individuals should aim to meet the Health Canada recommended 150 min of moderate-intensity physical activity per week."

When exercise intensity was examined, results showed that how long a person exercised was more important than how hard they exercised during each workout in improving microbes in the gut. Reasons for this are not known and are a topic of future work in the laboratory.

The study also showed that changes in the microbiome were not the same between different groups of individuals. The most beneficial changes were seen in those individuals of normal weight compared to those who were overweight. According to study investigator Dr. Chunlong Mu, PhD, a postdoctoral associate in Kinesiology, this is because "being overweight exerts its own influences on the gut microbiome independently of exercise. In this case, poor dietary habits outweigh some of the beneficial influences of exercise on the gut microbes."



## Sweets change our brain

Science Daily March 22, 2023

Chocolate bars, crisps and fries -- why can't we just ignore them in the supermarket? Researchers at the Max Planck Institute for Metabolism Research in Cologne, in collaboration with Yale University, have now shown that foods with a high fat and sugar content change our brain: If we regularly eat even small amounts of them, the brain learns to consume precisely these foods in the future.

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





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

### Our brain unconsciously learns to prefer high-fat snacks

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

During the study period, the test persons did not gain more weight than the test persons in the control group and their blood values, such as blood sugar or cholesterol, did not change either. However, the researchers assume that the

preference for sugary foods will continue after the end of the study. "New connections are made in the brain, and they don't dissolve so quickly. After all, the whole point of learning is that once you learn something, you don't forget it so quickly," explains Marc Tittgemeyer.

### Obesity risk may pass from mothers to daughters

Science Daily March 21, 2023



Women with obesity may share risk for the disease with their daughters, but not their sons, according to a new study published in the *Endocrine Society's Journal of Clinical Endocrinology & Metabolism*.

Obesity is a common, serious and costly disease affecting nearly half of the adults and 20 percent of children in the United States. It costs an estimated \$173 billion in medical care costs. People with obesity are at higher risk of developing diabetes, high blood pressure, heart issues, and many other conditions.

"These findings highlight that girls born to mothers

who have obesity or have high amounts of body fat may be at higher risk of gaining excess body fat themselves," said Dr Moon, of the MRC Lifecourse Epidemiology Centre, University of Southampton in Southampton, U.K. "Further studies are needed to understand why this is happening, but our findings suggest that approaches to addressing body weight and composition should start very early in life, particularly in girls born to mothers with obesity and overweight."

The researchers measured body fat and muscle in 240 children (9 years old or younger) and their parents in early childhood. They used this data to determine whether the body mass index (BMI) -- a screening tool for overweight and obesity -- and the amount of body fat and muscle in the child was related to that of their parents.

They found the girls had similar BMI and fat mass to their mothers, suggesting that girls born to mothers who have obesity or have high fat mass are at high risk of also developing obesity or overweight. The researchers did not find the same association between boys and their mothers or either girls or boys and their fathers.







## Mediterranean diet associated with decreased risk of dementia, study finds

Science Daily March 13, 2023

Eating a traditional Mediterranean-type diet -- rich in foods such as seafood, fruit, and nuts -- may help reduce the risk of dementia by almost a quarter, a new study has revealed. Experts at Newcastle University found that individuals who ate a Mediterranean-like diet had up to 23% lower risk for dementia than those who did not.

This research, published today in BMC Medicine, is one of the biggest studies of its kind as previous studies have typically been limited to small sample sizes and low numbers of dementia cases.

### Priority for researchers

Scientists analysed data from 60,298 individuals from the UK Biobank, a large cohort including individuals from across the UK, who had completed a dietary assessment.

The authors scored individuals based on how closely their diet matched the key features of a Mediterranean one. The participants were followed for almost a decade, during which

time there were 882 cases of dementia. The authors considered each individual's genetic risk for dementia by estimating what is known as their polygenic risk -- a measure of all the different genes that are related to the risk of dementia.

Dr Oliver Shannon, Lecturer in Human Nutrition and Ageing, Newcastle University, led the study with Professor Emma Stevenson and joint senior author Professor David Llewellyn. The research also involved experts from the universities of Edinburgh, UEA



and Exeter and was part of the Medical Research Council-funded NuBrain consortium. Dr Shannon said: "Dementia impacts the lives of millions of individuals throughout the world, and there are currently limited options for treating this condition.

Finding ways to reduce our risk of developing dementia is, therefore, a major priority for researchers and clinicians. Our study suggests that eating a more Mediterranean-like diet could be one strategy to help individuals lower their risk of dementia."

The authors found there was no significant interaction between the polygenic risk for dementia and the associations between Mediterranean diet adherence. They say this may indicate that even for those with a higher genetic risk, having a better diet could reduce the likelihood of developing the condition. This finding was not consistent across all the analyses and the authors propose further research is needed to assess the interaction between diet and genetics on dementia risk.

John Mathers, Professor of Human Nutrition, Newcastle University, said: "The good news from this study is that, even for those with higher genetic risk, having a better diet reduced the likelihood of developing dementia. Although more research is needed in this area, this strengthens the public health message that we can all help to reduce our risk of dementia by eating a more Mediterranean-like diet."





the “development of new food products that prioritize health and nutrition by providing a better understanding of the potential benefits of plant extracts.

“However, manufacturers should conduct thorough

research and testing to select safe, functional, high-quality, sustainable and cost-effective plant extracts for their food products,” she cautions.

## Plant power: Bioactive extracts boost foods’ nutritional and sensory properties, study reveals

31 Mar 2023 Nutrition Insight

Plant extracts rich in active compounds offer food manufacturers an opportunity to create innovative food products that meet consumer demand for healthier and more environmentally friendly food options, according to a new review. Exploring a range of applications, scientists expect the popularity of plant extracts in food to continue, though manufacturers should consider limitations and challenges.

“By incorporating these extracts into food products, manufacturers could increase their nutritional value, add colour or fragrance and extend their shelf life without or with lower doses of synthetic additives,” lead researcher Dr. Anna Plaskova, from Tomas Bata University, Czechia, tells NutritionInsight.

She hopes the study encourages



## Enhanced food safety

As plant-based diets proliferate, so do the available solutions in food formulators’ toolkits. In previous coverage, Hibiscus sabdarifa extract was found to be ideal toward creating functional cupcakes.

The new Czech review, published in *Frontiers in Nutrition*, identifies numerous applications for water and ethanol-water plant extracts in meat products, vegetable oils, pastries, beverages and dairy products. The authors note that antioxidant-rich plant extracts can improve food safety by partially or fully replacing synthetic antioxidants linked to safety and health issues such as toxicological and carcinogenic consequences.

## How to select plant extracts

Plaskova suggests that food manufacturers research a specific plant extract and its properties, such as flavour, colour and potential health benefits, to identify the right



one for their products. This research should include an analysis of any potential risks or adverse effects of the extract.

Next, they should check the regulatory requirements for using the plant extract in food products in the relevant markets where the product will be sold. “Ensuring that the extract is approved for use and complies with applicable regulations is important.”

Plaskova indicates that manufacturers might work with reputable suppliers or test the prepared extract in a laboratory to ensure quality control. “They should ensure that the plant extract is of consistent quality and purity and has been extracted using safe and effective methods. Another important step is stability testing to determine how the plant extract will perform in the food product over time, including heat, light, pH and other factors. It is also crucial to consider the production process and how the plant extract will integrate with other ingredients and processing methods. Finally, manufacturers should conduct sensory testing of their novel product to determine how the plant extract affects its attributes, such as flavour and appearance.”

By Jolanda van Hal



**“Women are more salt sensitive” : Chromosomes, hormones and sodium heavy diets drives hypertension, says study**

07 Mar 2023 Nutrition Insight

Researchers at the Medical College of Georgia, Augusta University, found that hypertension caused by salt sensitivity was higher among females than among males in a new study.

The researchers suggest imposing a lower threshold for hypertension in women, allowing quicker notification of changes and actions of intervention. “The realities are that women and men regulate our blood pressure differently and our blood pressures are different at baseline,” says Dr. Eric Belin de Chantemele, physiologist in the Vascular Biology Center at the Medical College of Georgia, Augusta University.

Likely reasons for the observed difference between sexes are chromosomes, sex hormones such as estrogen and genetics

such as estrogen receptors, the authors note. “Evidence also indicates that females tend to like salt more than males. Like many sex-related differences, the proclivity for salt likely relates to the physiological need to retain sodium and the fluid following sodium, sufficient to sustain another life in pregnancy. There is also evidence that the male hormone testosterone suppresses the appetite for salt,” Belin de Chantemele states.

**Fighting a common belief** Published in Hypertension, the study stresses the common belief that women are more protected against cardiovascular diseases than men. While confirmed in several rat studies, human studies have found



contradicting results. Before menopause, women are more salt sensitive, and when entering menopause, it exacerbates the prevalence and severity, explain the authors.

“That supports yet another emerging concept that the sex chromosome XX predisposes females to salt sensitivity, presumably because females need to nearly double their fluid volume during pregnancy, and estrogen does help mitigate some of the related increased risk, at least until its levels drop after menopause,” says Belin de Chantemele.

**Salt sensitivity**

Being salt-sensitive means the body naturally tends to “hold onto salt rather than disposing of excess in the urine.” This might also affect blood pressure, as if an increase or decrease of 10% in response to salt consumption, it’s considered salt sensitivity of blood pressure. “Salt sensitivity is one of the leading factors for hypertension. And, if you look at people with treatment-resistant hypertension - which is most people - most are salt sensitive,” Belin de Chantemele says. “It’s crucial to know the cause of that.”

Salt sensitivity is a usual factor in cases where hypertension is “not obvious,” such as kidney problems or treatment-resistant hypertension. The Centers for Disease Control and Prevention says that only one in four adults controls their hypertension. Belin de Chantemele maintains that reducing one’s salt intake reduces salt sensitivity, especially for women.





The World of Action on Salt, Sugar and Health recently stressed that improving the nutritional content of food and drinks by reformulating recipes with less salt, sugar and saturated fat is “by far the most important strategy that any company should make to improve public health.”

“We think it’s mostly the vasculature not relaxing in response to an intake of sodium that is leading to an elevation in pressure,” Belin de Chantemele underscores. “Animal studies of salt sensitivity generally indicate that the kidneys, which should excrete more sodium when we consume too much, work fine in females. In fact, human and lab animal evidence indicates that female kidneys are better at salt excretion,” he says. “The problem, it appears, is with the vasculature because salt should also make the blood vessels relax.”

Edited by Beatrice Wihlander

### Link between gut microbiota and diets investigated for non-alcoholic fatty liver disease

20 Mar 2023  
Nutrition Insight

Two recent studies, Spain-based and US-based,



investigated the role of diets and eating patterns and the link between the gut microbiota, respectively, on developing or reducing non-alcoholic fatty liver disease (NAFLD). Besides being the leading cause of chronic liver disease, NAFLD is associated with harmful conditions such as metabolic syndrome, obesity, diabetes and dyslipidemia.

“Fatty liver disease is a global health epidemic,” says Kevin Staveley-O’Carroll, a professor in the department of surgery, one of the lead researchers of the study from Missouri. “Not only is it becoming the leading cause of liver cancer and cirrhosis, but many patients I see with other cancers have fatty liver disease and don’t even know it. Often, this makes it impossible for them to undergo potentially curative surgery for their other cancers,” Staveley-O’Carroll continues.

### Different dietary approaches

Published in *Nutrients*, the Spanish-based researchers from the University of Cordoba investigated the link between diets and developing NAFLD through a literature review of previously conducted studies. While arguing that genetics and diet play a role in

developing NAFLD, the study explains NAFLD’s relationship with cardiovascular disease. Due to the connection to obesity, NAFLD is forecasted to increase in the coming years,



making it a public health concern. The World Obesity Federation recently predicted that by 2035, 51% of the world’s population will be overweight or obese if current patterns continue.

The study notes that to this day, no medical drug has shown indication as a potential treatment, although many drugs have been tested. Therefore, they push for lifestyle modifications by following a healthy diet and exercising regularly, as weight loss has shown potential improvements.

It further concludes that socioeconomic status plays a role in how people eat, as high-income groups tend to eat healthier. Additionally, nutritional knowledge and education showed a higher awareness, leading to improved eating patterns. They also found that intermittent fasting positively affected participants with Type 2 diabetes, as NAFLD reduced.

Edited by Beatrice Wihlander



# FOOD SCIENCE & INDUSTRY NEWS

## Finding the sweet spot in sugar reductions

Science Daily March 24, 2023

Excess sugar consumption is a problem all over the world. It can lead to a number of health issues, including diabetes and cardiovascular disease, resulting in an increased burden on the healthcare system.

'Companies have reduced the sugar content of their products over the years, in addition to marketing their best-known brands in smaller packages ever more frequently. Although this has not reduced the average sugar content, the consumer's sugar intake per product has gone down in absolute terms', Guyt explains. 'Soda manufacturers are having to strike a balance between reducing their products' sugar content on the one hand and maintaining or growing their turnover on the other. This can be difficult to achieve if consumers reject less sugary alternatives.' Using data from the US, Guyt and Keller

investigated whether the sugar content reduction strategies of soda manufacturers had an effect on sales -- and if so, under which circumstances.

### Cannibalisation

'While reducing the sugar content of sodas leads to lower sugar consumption, replacing a sugary drink with a new diet or sugar-free version tends not to make a difference to the producer's bottom line', Guyt says. 'This is because of brand cannibalisation: the increased sales of the new diet version and the reduced sales of the sugary version of the same drink cancel each other out.

Clearly, this is good news for consumers from a health standpoint, but less appealing when it comes to the brands' overall results. They benefit more from selling sugary drinks. However, we found that

marketing the new drinks in smaller packages -- like what the Americans call "mini cans" of 7.5 and 8 fl oz (around 240 ml) -- does lead to an increase in the brands' overall sales figures. This can be explained by the fact that these packages are as popular among consumers as the larger packages of competing brands that they used to buy. Overall, it is a win-win situation for consumers and producers alike.'

### 'Fun' instead of 'healthy'

Among the other findings was the significant role played by a brand's product strategy. The researchers discovered that sodas with less sugar sold better when they were marketed with an enjoyment claim, such as 'sweetened with sugar', and worse when marketed with a health claim, such as 'no sugar'. These products also sold better when marketed under the parent brand compared to a subordinate brand.





Keller: 'Sugar content reduction efforts are noticeably more effective when not too much attention is drawn to them. Zero Sugar product range is a good example of this. In 2021, the range was redesigned to make it look more like "regular" Coca-Cola, as opposed to the Coca-Cola Zero of before.' Smaller packages also work better when marketed as a fun, high-quality alternative instead of a healthier one. Sales figures increase even further when smaller packages are sold as single products rather than as part of a multi-pack.



## Robust chocolate: Study finds health benefits of cocoa are "resilient to processing"

02 Mar 2023 Nutrition Insight

Commonly used means of processing cocoa beans, such as fermentation and roasting, do not reduce the health benefits of chocolate, according to a team of researchers at Pennsylvania State University, US. This reaffirms previous studies on cocoa health and eliminates

worries that processing could revoke its superfood status.

The study, published in the *Journal of Nutritional Biochemistry*, found that "treatment of mice with 80 mg/g dietary cocoa powder for eight weeks reduced the rate of body weight gain in both male and female mice (46-57%), regardless of fermentation and roasting protocol." Joshua Lambert, professor of food science and co-director of Penn State's Center for Plant and Mushroom Foods for Health, tells FoodIngredientsFirst what this study may mean for consumers seeking healthy indulgence.

"For the consumer, I think this means that it is possible to balance the flavour and aroma profile of a chocolate or cocoa product with its potential health effects. Having a tasty product is not mutually exclusive of having a product with health beneficial effects."

### "Greater freedoms" for cocoa processing

The study supports greater freedoms for cocoa producers. "The resilience of the anti-inflammatory effects to processing suggests that manufacturers have latitude to make products that balance taste and potential health beneficial effects," notes Lambert. "One of our long-term goals is to develop health-related quality markers that can help guide processing decisions by cocoa processors and give them the ability to tune operations to get a cocoa that tastes good, smells good and has maximal health-



related activity."

### The science of cocoa health boosts

Cocoa's health boosts appear to be driven by beneficial compounds present in the ingredient. These benefits offered are one of the main selling points of the ingredient, notably its effects on preventing heart disease and issues associated with obesity.

"The epidemiological studies show that consumption of chocolate is associated with reduced risk of stroke, coronary heart disease and heart attack," continues Lambert. "There have been quite a few intervention studies that have shown that chocolate or cocoa consumption can reduce blood pressure and improve vascular function."

The US Food and Drug Administration (FDA) recently stated that it would not object to a qualified health claim for chocolate reducing the risk of cardiovascular disease for conventional foods. However, the claim will only apply to cocoa flavanols in high-flavanol powder, a powder that contains at least 4% of naturally conserved cocoa flavanols, or food with high-flavanol cocoa powder.





“Based on our data and data from others, it seems like some of a class of compounds in cocoa known as proanthocyanidins can bind to the enzymes and block access of the fat or carbohydrate substrate to the active site of the enzyme,” says Lambert. “This reduces digestion and leads to those compounds passing through the gastrointestinal tract.”

### Targeting obesity

Aside from the aforementioned health benefits, the study suggests that moderate consumption of cocoa could have beneficial effects against chronic inflammation. Lambert supports the belief that cocoa could especially benefit overweight consumers, if used correctly. “In the context of improvements to overall diet and lifestyle, I think that cocoa might provide its biggest benefit by helping improve comorbidities of obesity (e.g., cardiovascular disease, fatty liver disease) and reducing chronic inflammation, which is a driver of these comorbidities.”

“I also think that a moderate amount of chocolate as a reward might be a good motivator to help people stick to a diet or lifestyle change plan,” he adds, noting that indulgence is not necessarily a bad thing. “If the promise of a square or two of chocolate helps get you out the door for a walk or helps you stick to eating five servings of fruits

and vegetables a day, then that would be a positive.”

By James Davies

## Prenatal supplements for the modern woman: Efficient and tastier formats needed

02 Mar 2023 Nutrition Insight

Busy, modern lifestyles can make getting the right nutrients challenging, and during pregnancy, consumers are as time-pressed as ever. At a time when women are finding more physical challenges - fighting morning sickness, sleeplessness and backaches - they are also in a critical window where nutrition is paramount. In commemoration of International Women’s Day (March 8), NutritionInsight speaks with DSM, Gnosis and AB-Biotics on innovation that can help brands deliver the right supplement forms and dosages for mothers-to-be.

### Supplements for the modern woman

To better understand what influences their choices for maternal supplements, DSM recently conducted an in-depth Usage and Attitude consumer survey. According to expectant mothers, iron, folic acid and calcium are perceived as the most important nutrients. They also express concerns about body pains, anxiety and sleep issues when it comes to their own health.

Yet many mothers - especially those with busy modern lifestyles - find it challenging to meet these nutritional and well-being



requirements, says Kristen Finn, nutrition science advocacy lead for early life nutrition. “There is a clear need for complete nutritional solutions that come with strong science to address their key concerns during pregnancy.”

While standard prenatal supplements focus on vitamins and minerals, the microbiome is another area to watch for innovation. “We know the mother’s gut microbiota has key effects in the development of the baby’s gut microbiota - a healthy gut and vaginal microbiota will affect how the newborn’s microbiota develops,” says Sergi Audivert, executive director at AB-Biotics.

Solutions for gut health may also alleviate some of the common pain points associated with pregnancy. “Dysbiosis - an imbalance of the gut bacteria - is related to a variety of diseases and conditions, including pregnancy-specific gastrointestinal diseases,” underscores Audivert. Some of these include intrahepatic cholestasis of pregnancy (a liver disorder), hyperemesis gravidarum (excessive nausea and vomiting) and constipation.





### Pill fatigue in already fatigued women

Taste is also a concern, with Finn pointing out that an important trigger for discontinuing supplementation is unpleasant sensory properties such as taste, size of the pill or tablet and the number of pills or tablets to be taken.

"The majority of pregnant women still consume traditional formats such as pills and capsules, but there is a need for tasty formats that can deliver adequate nutrition in a compact and consumer-



friendly way," Finn states. DSM is innovating to put more nutrition in smaller formats by reducing the serving size of its DHA ingredients. This year the company will launch a portfolio of market-ready solutions with "the highest dose of DHA in the smallest serving sizes," making DHA supplementation easier to adhere to for pregnant women.

DHA is well-recognized for its importance in prenatal development and for its use in infant formula, advocated by the Food and Agriculture Organization of the UN and the European Food Safety Authority. However, the recommended dosage can vary

widely. "Several clinical studies have shown that DHA supplementation during pregnancy reduces the risk of preterm birth," says Finn. In the most recent study, 1,100 pregnant women were randomized to receive either 200 mg or 1000 mg of DSM's algal DHA prior to 20 weeks gestation until delivery.

They found that the higher dose (1000 mg DHA) was superior to the lower dose (200 mg DHA) for reducing preterm birth with a high degree of probability (posterior probability=0.95). "This is an important finding as prenatal vitamins typically contain between 0-200 mg of DHA, which is not enough to optimize preterm birth risk reduction for many women," she adds.

### Good bacteria for a healthy bump

Many studies highlight the importance of a healthy gut microbiota during pregnancy, since it has crucial roles in nutrient acquisition, immune remodelling and protection against infection, Riera highlights. "This is why it is important to study specific probiotic strains that can support gut microbiota during pregnancy, which will have benefits both for the mother and the child."

As a human residential Bifidobacteria, *B. longum* KABP 041 is a proprietary probiotic strain developed by AB-Biotics, which is naturally found in breast milk and the infant's gut. "It can support mothers' health during pregnancy and

contributes to the symbiotic environment of breastmilk to ensure a healthy gut microbiota development in the baby."

The company also touts a blend of four probiotic strains called Nouri Prenatal Health. Launched in collaboration with Nouri in the US, the blend contains *P. acidilactici* KABP 021, *L. plantarum* KABP 022, *L. plantarum* KABP 023 and *B. longum* KABP 042, vitamin B6 and plant-based omega oil. "The strain mix has shown a unique mechanism of action with the potential to improve intestinal barrier function and intestinal permeability - two key functions that support gut microbiota during pregnancy.

All four strains have undergone extensive research for the relief of gastrointestinal (GI) symptoms, including bloating, pain, and diarrhea and have been shown to improve sleep, energy, emotional well-being and other factors. As mental health comes to the forefront, more mood claims could appear on prenatal vitamins. Gnosis notes that - in addition to preventing neural tube defects - folate is linked with mood and cognition. DHA has also been linked with aiding sleep.

By Missy Green







## Power for the people: Sports nutrition diversifies as active lifestyles proliferate across generations

16 Mar 2023 Nutrition Insight

Sports nutrition has transitioned beyond the realms of professional athletes to the everyday consumer, spurred by the overriding industry themes of health consciousness and more active lifestyles. Consumers are exercising more regularly across demographics and demanding effective nutritional supplements to fuel their ambitions.

NutritionInsight sits down with leading ingredient suppliers FrieslandCampina Ingredients, Rousselot, Lonza, Gencor and Pharmako Biotechnologies to explore the latest in sports nutrition consumer trends, ingredient solutions and delivery formats. We also consider how sports nutrition might evolve over the next five years.

“The demand boom for sports products is heavily influenced by several intersecting health and nutrition trends, including today’s consumers being increasingly health conscious. This trend has been influenced by the pandemic, but indications suggest that it won’t be short-lived,” says Vicky Davies, global marketing director for Performance, Active & Medical Nutrition at

FrieslandCampina Ingredients. “Consumers are reevaluating what it means to be healthy in ways that are radically different from previous generations. They’re focused on total body-and-mind wellness rather than individual issues like weight loss or immunity. Exercise, with its physical and mental benefits, is a significant part of this.” Moreover, what Davies refers to as the “relatively vague” term of “healthy aging” is making way for “active aging,” with cross-generational demand for sports nutrition proliferating.

Florencia Moreno Torres, Health & Nutrition global business development manager at Rousselot, adds: “As older people adopt a healthier, more active lifestyle to manage or even prevent age-related issues and maintain a good quality of life, the sports nutrition market is also benefiting from a growing curiosity toward age-specific products. Another market driver is consumers’ rising acceptance of protein supplements, which used to be solely linked to muscle building. While there’s still much to learn about proteins, this is a great opportunity for the industry to raise awareness of the different characteristics and functionalities of various proteins like collagen related to joint and bone health support.”

### Sports nutrition for the masses

Nutrition companies recognize that capitalizing on the



expanding market for sports nutrition requires formulated products that appeal to everyday consumers by way of taste, texture and convenience. “Big bags of chalky protein were okay for professional athletes prioritizing their nutrition and training, but in 2023 they don’t always cut it. To appeal to the active consumer demographic, products need to taste and look good and be easy to incorporate into busy lifestyles,” continues Davies. “Linked to taste and texture is the increasing consumer demand for variety in flavors, formats and protein sources. This appetite for a range of protein sources is also driving demand for more plant-based protein options.”

In the plant-based space, FrieslandCampina Ingredients’ Plantaris range is designed using processes that reduce the “earthy” notes often present in plant-based protein products. The company’s high-quality protein ingredients also include its Nutri Whey Isolate Clear, which can be used to create on-trend protein waters and gels, while its Excellion Textpro is designed for use in high protein bars for improved texture.





### Affordable bioavailability

Sports nutrition for the everyday consumer must be affordable to be effective. This requirement has been reinforced by the current cost-of-living

crisis, which is driven by geopolitical and economic uncertainties like Brexit and the Russia-Ukraine war.

“Since the cost-of-living crisis is affecting individuals of lower- to mid-income brackets, the industry is looking to adjust product dosages and serving sizes for consumers to continue purchasing sports nutrition products,” notes Mariko Hill, global innovations manager at Gencor. “For that reason, delivery technologies are a huge advantage for brands as the use of these - such as LipiSpense or AquaCelle technology - enables ingredients to have superior bioavailability and brands to use lower dosages.”

Gencor’s Palmitoylethanolamide (PEA) ingredient for pain relief and anti-inflammation is often used in sports nutrition products to support joint health, muscle recovery and sleep. However, PEA is lipophilic, meaning it has absorption challenges. For that reason, the company has developed Levagen+ - a bioavailable form of PEA utilizing LipiSpense technology to increase the ingredient’s bioavailability and functionality.

Eric Meppem, commercial director at Pharmako Biotechnologies (Gencor’s

Meanwhile, Rousselot harnesses long-standing partnerships with organizations like Olympic Training Centre Papendal in the Netherlands to explore the effects of collagen supplementation on sports performance and recovery times. “Leading figures have shared their experiences on how our collagen peptide brand Peptan has helped them perform better. Thanks to these insights, we’re able to look beyond professional sport and work closely with supplement brands to explore how Peptan can benefit casual sportspeople and lifestyle athletes,” says Moreno Torres.

“After all, today’s discerning and well-informed consumers want sophisticated science-backed solutions, which means supplement manufacturers need an experienced partner to expand their portfolio and deliver proven sports nutrition products for everyday consumers.”

Rousselot also targets joint health through its Colartix solution, a unique cartilage collagen matrix made of naturally occurring collagen peptides and glycosaminoglycans. A recent consumer study found that even at a daily dose of 1 g per day, Colartix demonstrated a steady decrease in joint discomfort across age, gender and activity types.



sister company), summarizes: “Brand companies can continue to appeal to sports nutrition consumers by offering novel formats, smaller doses and smaller pack sizes. Products that have a faster onset of action due to improved bioavailability lead to more repeat sales and consumer recommendations.

Pharmako’s LipiSpense dispersion technology improves the bioavailability and functionality of important lipophilic ingredients, enabling greater efficacy, lower doses and faster onset of action.

By Joshua Poole

### Pink Gold: Animal-free lactoferrin poised to fortify plant-based dairy products, boost sports performance

22 Mar 2023 Nutrition Insight

TurtleTree has debuted the world’s first precision fermentation-produced lactoferrin dubbed LF+, a high-value bioactive milk protein that boosts immunity, regulates iron, and is good for digestive health.





### Health and business-boosting benefits

Lactoferrin is also otherwise known as “pink gold” due to its iron-rich pink hue, also naturally found in cow’s milk, but the low concentrations and current resource-intensive extraction processes limit access for many people.

“Given where the economy is, there are many benefits of focusing on ingredients vs. commodities. Not only does an ingredient like LF+ offer major health benefits, but on the business side, lactoferrin presently trades at around US\$750 to US\$1,500 per kilogram, which is much more than casein or whey, which trade under US\$14 per kilogram,” Dr. Schnitzler continues.

“Compare that to a commodity product; the cost advantages are even starker. So just about out of the gate, we are going to have a healthy profit margin that will only go up as we continue to optimize our processes. We’re presently going through our pilot runs for our FDA regulatory approval, which should be in place by the end of the year. Then next year, we’ll be ramping up into a significant commercial scale.”



Speaking with FoodIngredientsFirst, Dr. Aletta Schnitzler, TurtleTree’s chief scientific officer, explains how LF+ is the world’s first precision fermentation-derived bovine recombinant lactoferrin and likely the first to be brought to market for the benefit of consumers.

“Lactoferrin is an essential bioactive component of cow’s milk that helps people thrive. Cow’s milk is absolutely jam-packed with lots of nutrients that help support early development, life, and growth. It also contains sophisticated proteins that have evolved to be multi-functional and support immunity and gut health and iron regulation,” says Dr. Schnitzler.

“Lactoferrin is one of these amazing proteins that have many different functions to support how we thrive and grow. The lactoferrin already on the market is extracted from cow’s milk and, being highly resource-intensive and costly to produce, is in very limited supply. By using precision fermentation, we can make lactoferrin at much higher volumes without ever involving an animal.”

The majority of lactoferrin on the market goes to supporting the infant formula market, and rightfully so. But by increasing the supply using precision fermentation, we are

unlocking access to this valuable protein and working to expand the market into adult nutrition, including harnessing the bioactive protein to fortify the nutrition of plant-based milk.”

### Nutrition & sustainability

Plant-based milk is nutritionally quite different than cow’s milk. It doesn’t naturally contain bioactive ingredients like lactoferrin, so recombinant proteins like LF+ can now enhance the nutritional benefits of plant-based foods and beverages. LF+ is Turtle Tree’s first big product unveiling and the

company is currently undergoing regulatory approval in the US and plans to launch LF+ to the market by the end of the year.

The food industry is a big contributor to significant

environmental issues. A vast portion of agricultural land is used to raise livestock, yet only a fraction of society’s protein input comes from meat and dairy. “So there’s a big disconnect between the resources the world puts into generating conventional meat and dairy and the benefits that it gets from it. Harnessing techniques like precision fermentation that use much less land, less energy, and less water, can help us significantly enhance food system sustainability,” Dr.Schnitzler highlights.





investing in the future,” says Carmen Burbano, head of school-based programs at the WFP.

“As the world grapples with a global food crisis, which risks

robbing millions of children of their future, school meals have a vital role to play. In many countries where we work, the meal a child gets in school might be the only meal they get that day,” she continues.

### The coalition

Eighty-three stakeholders, including major UN agencies, set three main goals to restore what was lost during the pandemic.



## WFP reports 41% of children globally have access to nutritious school meals

22 Mar 2023 Nutrition Insight

Global crisis levels of hunger affects 345 million people, 153 million of whom are children, according to the United Nations (UN) World Food Programme (WFP) recently released State of School-Feeding Worldwide report.

However, since 2020, the number of children with access to school meals has increased by 30 million, amounting to 41% of school children globally now receiving school meals. Pointing to the fact that school meals are a “critical safety net for vulnerable children and households,” the WFP reports that 420 million children globally have access to school meals.

To ensure all children get nutritious meals daily by 2030, 76 governments have joined a coalition. The COVID-19 pandemic disrupted free lunch programs, which the governments are working to restore, compared to 2020. “This is good news.

Governments are prioritizing children’s well-being and



Sustain, the UK-based alliance of organizations aiming for better food systems, points out a few countries out of the 76 that already provide its nation’s children with free school food and how improvements have been observed in educational outcomes and nutritional health.

Taking India as an example, with an annual cost of US\$2.8 billion to ensure all children have access to a hot meal “no questions asked,” it’s the largest school food for all scheme in the world and has been in place since 1995. Women who have benefitted from the program have been shown to give birth to fewer short children – a common sign of malnutrition.

Another example is Sweden. Children from families in the lowest income quartile who received free school meals for nine years increased their lifetime income by 6%, resulting in a benefit-to-cost ratio of 7:1, Sustain reports.

By Beatrice Wihlander

By 2023, it aims to reach those missed in low and lower-middle-income countries, and by 2030 to improve the quality and efficacy of school meals globally. The latter refers to “facilitating a healthy food environment in schools and promoting safe, nutritious and sustainably produced food, linked to local production where appropriate,” reads the report.





## C-FEWS toolkit for farming and food insecurity to tackle climate change threats

27 Mar 2023 Nutrition Insight

Scientists have developed the C-FEWS (Climate-induced extremes on Food, Energy and Water Systems) framework, a toolkit for farmers as climate change threatens the current food, energy and water system, presenting a set of analytical tools to forecast catastrophes and the needed measures to respond.



"It's not hard to see that there are intersections between food, energy and water that could create some pinch points or constraints in the behaviour of one part of the system versus another," says Charles Vörösmarty, lead author and professor of environmental sciences at the City University of New York, US. "We need to look at how these systems

interact when they all get hit simultaneously by these climate changes," he notes.

The study focuses on the US's Northeast and Midwest regions, accounting for 40% of the US population and GDP.

### Need for resources

The scientists argue that as heat waves, wildfires, droughts and floods threaten the current systems due to climate change, preparative measures must be implemented to tackle those events when they occur on a local and regional scale.

"In developing the framework, we've held several meetings with regional stakeholders, trying to develop a sense of what they care about, and then seeing how our modelling framework can be used to help

them think through those issues," says co-author Jerry Melillo, a scientist at the Marine Biological Laboratory, Woods Hole, Massachusetts, US.

The toolkit guides evaluating options and decision-making related to specific local conditions. "We are particularly interested in how people respond to climate change in these two US regions given their various interests - and the focus was on the nexus of food, energy and water," says Melillo.



### Investigating infrastructure

Looking at data for the past 40 years, the scientists looked at two categories of infrastructure systems, gray infrastructure - power plants, sewage and water delivery systems - and green infrastructure, which encompasses floodplains, cropland and forests.

The researchers further examined how the systems have been affected by extreme weather to be able to calibrate models and forecast future impact. "Even though it's a global climate that's changing, the manifestations of those changes are national, if not regional, if not the state level, in their scope. We're learning how to tackle a regional perspective where we are focusing on these macro-scale dynamics," highlights Vörösmarty.

Furthermore, the series includes climate-induced pressures on food, energy and water systems and stresses the importance of stakeholders and modelers to bring the topic up for conversation for the relevant policymakers.





foods, Giancarlo Addario, principal at Five Seasons Ventures, spotlighted three key areas: preventing health-related conditions, performance declines of the brain and body with age, and

improving post-workout recovery.

Eoin Keenan, founder and CEO of Goodrays, revealed the results from a consumer-focused piece of research the brand had conducted the previous week and found two key things consumers were looking for - healthy ageing and performance optimisation.

“The first was longevity, particularly in the over 30s category. They’re looking at a wide range of health products, not on a tangible basis... not asking ‘how is my gut feeling today’ and ‘how is my heart feeling today’, but ‘how is this going to be part of my diet now and impact my overall wellbeing for longevity. The other point is performance, more in terms of ‘how can I improve my performance by 5-10%’. I think consumers are

looking at optimisation rather than a full solution. If they were looking for a solution, they would be going to a doctor or

pharmacy,” he continues.

With regards to the customer base for his CBD brand, he explained: “People are using it for anxiety, stress, and sleep. Those are the three main

things we focus on. Other than that, there’s pain, arthritis, and other medical reasons, but we are a wellness brand. In terms of the clinical studies going on behind the scenes, they are really positive with a 70-80% efficacy. When you talk to the wellness consumer, this is what they want... they want honesty and transparency and not a quick fix. And there isn’t a quick fix. It’s about enhancement, and you must manage consumer expectations.”

### Untapped potential

Keenan highlighted that “retailers are slightly behind in offering health and wellness to the consumer”, following the company’s launch into top UK supermarkets, including Tesco and Waitrose, at the end of last year. “In one of the retailers we launched in, their soft drinks had been declining over the last eight years. And just this year from launching the health and wellness range, for the first time their soft drinks are seeing growth,” he stressed.

He added that the global functional drinks market is expected to grow at compound average growth rate (CAGR) of 7.2% until 2027, whilst CBD’s growth is predicted to be even more rapid. He attributed this to a consumer demand for added benefits to products, stretching further than existing ‘low-fat’ or ‘low sugar’ health claims.



“We’re trying to provide policymakers with a tool to think quantitatively about how best to manage these systems. With some optimum goal of minimizing unintended consequences and promoting intended consequences. We’re trying to provide a clear picture of appropriate policy levers for doing this management,” details Melillo.

The World Health Organization recently stressed the importance of water and sanitation systems for good nutrition and how climate change impacts crop productivity and food prices. Edited by Beatrice Wihlander

### Functional Foods for the Mind: What Are Consumers Looking For?

By Olivia Brown 04-Apr-2023 - Food Navigator USA

A cognitive health innovation panel hosted at the Positive Nutrition summit last week (March 30th), discussed key consumer demands in a crowded market, legislation challenges, and the future potential for the space.

Discussing the consumer problems solved by functional



Professor David Nutt, Chief Research Officer at GABA Labs, discussed his company's production of the first botanical spirit containing the neurotransmitter GABA; with studies suggesting its ability to deliver calming effects.

"We've moved on to look at the broader utility of GABA. We already know the microbiome and the effects on the enteric nervous system, and there are loads of GABA receptors in the enteric nervous system. There's very new data showing that many of the microbes in the gut use and produce GABA," he stresses, suggesting the potential for its use within probiotics to see benefits to cognition.

He also hinted at the potential for such products to alleviate the symptoms of menopause, highlighting the likely importance of the microbiome in the condition.

### Gut-brain axis

Miguel Freitas, VP of Scientific Affairs at Danone, also discussed the importance of the gut in this cognitive space, adding: "The gut microbiome plays a key role in regulating both the brain and the gut. What's even more exciting, it that biotics could influence the brain. There are a lot of on-going studies looking at strains like Bifidobacterium

and Lactobacillus that have been shown, to a certain extent, to influence cognitive health".

He continued to discuss the bi-directional effect of the brain and the gut, stressing: "The door is open, and biotics could have a real impact on these discussed issues of anxiety, stress, and sleep. Different studies are being done using different clinical models."

He described a trial conducted at Danone in which consumers were administered a probiotic over several weeks. They were then shown stressful images, with brain scans monitoring changes in terms of the participants' perception of the stress. It was noted that the probiotic significantly affected brain activity in regions processing emotion and sensation. "The field is evolving, and these clinical models are evolving. The potential is big," he emphasised.

### Key challenges

With regards to the challenges in this market, Addario explained it is difficult for brands to stand out from the crowd, and concentrate on scientific backing: "There are the established regulatory challenges in this field. But it



is also an over-crowded space, and the challenge is how to stand out. The third problem is the trade-off between scientific and lifestyle.

Whilst the scientific brand is less likely to be understood and less attractive, the lifestyle brand is not as trusted or transparent. So there needs to be a good balance of these two ingredients."

Freitas emphasised the broadness of the cognitive health field, ranging from Alzheimer's prevention to alleviating symptoms of stress and depression. But he noted that the claims allowed for such products will likely remain largely restricted by regulations.

"I don't see us having a probiotic that will treat, for example, anxiety, stress, and depression. I think it will be more claims like mental well-being or sleep support," he predicted for future new product development in the space for cognitive-focussed biotics.



# REGULATORY NEWS

## FDA examines the definition of “healthy” with dietary guidance statements on food labels

27 Mar 2023 Nutrition Insight

Consumers will soon have more nutritional information on the label to help improve their dietary choices, as the Food and Drug Administration (FDA) guides food manufacturers on how and when to use Dietary Guidance Statements on food labels.

The FDA also plans to reduce salt intake in standardized foods. In a proposed rule, the FDA states it will change standards of identity for food to include safe and suitable salt substitutes to help support a healthier food supply by facilitating industry innovation to reduce sodium content and assist consumers in reducing their salt intake.

Its draft guidance on Dietary Guidance Statements should ensure food manufacturers promote good nutrition, provide greater consistency in labelling and assist consumers in making informed choices. “The Dietary Guidance Statements draft guidance, reducing sodium intake and updating the definition of ‘healthy’ are examples of how the agency is showing its commitment to fostering a healthier food supply for all

and empowering consumers with more informative and accessible labeling to choose healthier diets,” says Susan Mayne, director of the FDA’s Center for Food Safety and Applied Nutrition.

## Sodium alternatives to reduce salt intake

In the proposed rule on salt alternatives, the FDA does not list permitted substitutes but adds they need to be safe and suitable to replace some or all of the salt in a standardized food. The used alternatives need to safeguard food safety and other essential characteristics of the food. In 2021, the FDA issued industry guidance on short-term voluntary sodium reduction targets in over 160 packaged and restaurant-prepared foods categories. The current proposal could help manufacturers meet those targets.





“Most people in the US consume too much sodium. The majority of sodium consumed comes from processed, packaged and prepared foods, not from salt people add to their food when cooking or eating,” adds Mayne.

“This effort, combined with the FDA’s voluntary sodium reduction targets, is part of the agency’s overall nutrition strategy to create a healthier food supply, provide consumers with information to choose healthier foods and improve the health and wellness of our nation.”

specific amounts of saturated fat, sodium and added sugars. It aims to reduce the burden of chronic disease and advance health equity through improved nutrition.

“The FDA is committed to being a part of the solution to improve the health of millions of Americans. Today’s action is another step toward helping consumers make informed choices about their foods,” adds FDA Commissioner Robert Califf.

“Creating a healthier food supply, a key priority in the FDA’s nutrition work, has the potential to improve Americans’ health and reduce preventable diet-related diseases and deaths,” adds Califf. “Reducing sodium in the food supply may also advance health equity—unfortunately, hypertension and other diet-related diseases disproportionately impact underserved communities.”

In another initiative, the FDA updated the definition of “healthy” on food labels to help consumers easily identify healthy food choices. The American Herbal Products Association has stressed dietary supplements should be exempted from this proposed legislation. In addition, the FDA will start assessing different strategies to reduce added sugar consumption.

By Jolanda van Hal



In a recent study, researchers advocate for a new carbohydrate food quality score model that evaluates carbohydrate quality in a more culturally inclusive way and aligns better with the Dietary Guidelines for Americans.

### National strategy on hunger, nutrition and health

Both initiatives are part of the US National Strategy on Hunger, Nutrition and Health. This strategy includes a roadmap of the federal government’s actions to end hunger and reduce diet-related diseases by 2030 - while reducing disparities.

### Dietary guidelines

The FDA explains that eating patterns in the US do not align with federal dietary recommendations. Dietary Guidance Statements, such as “Make half your grains whole grain” and “Eat leafy green vegetables as part of a nutritious dietary pattern,” discuss how a food (group) can be part of a nutritious dietary pattern.

The draft guidance includes recommendations that products contain a meaningful amount of the food that is the subject of the statement and that foods do not exceed





## EFSA's risk assessment on nitrosamine exposure in food raises health concern

28 Mar 2023 Nutrition Insight

Exposure to nitrosamines through food, during its preparation and processing, "raises a health concern," flags the European Food Safety Authority in its latest draft opinion. EFSA's assessment on the public health risk related to the presence of nitrosamines in food, found ten nitrosamines are carcinogenic and genotoxic (may damage DNA).



"EFSA's assessment concludes that it is highly likely that dietary exposure to nitrosamines is above the level that raises a health concern for all age groups," an EFSA spokesperson tells FoodIngredientsFirst. Nitrosamines are not intentionally added to food, they are chemical compounds that can form in food as a consequence of food preparation and processing. However, in what foods exactly nitrosamines can be found is not clear, admits EFSA.

While nitrosamines have been found in different foodstuffs,

such as cured meat products, processed fish, cocoa, beer and other alcohols, they can also be found in other foods. "Data on the presence of nitrosamines in raw meat, vegetables, cereals, milk - including

human milk - and dairy products, fermented foods, pickled preserves, spiced foods and products cooked in different ways are very limited," the spokesperson explains..

Nonetheless, the body believes meat and meat products are the most important food group contributing to nitrosamine exposure, recommending consumers balance their diet with a wider variety of foods to reduce intake. Some countries like France have been proactive in targeting nitrates, with France adopting a nitrates law in 2022.

### Carcinogenic and genotoxic

Ten of the 23 nitrosamines analyzed found in food are carcinogenic and genotoxic, according to EFSA's assessment. "Based on animal studies, we considered the incidence of liver tumours in rodents as the most critical health effect," says Dr. Dieter Schrenk, chair of EFSA's panel on contaminants in the food chain. "To ensure a high level of consumer protection, we created a worst-case scenario for our risk assessment. We assumed that all nitrosamines

found in food had the same potential to cause cancer in humans as the most harmful nitrosamine, although that is unlikely," he continues.

Dietary exposure to nitrosamines was only assessed for cooked, unprocessed meat and fish, with the authors explaining that there are uncertainties in the study related to "the lack of data on important food categories." Following a request from the European Commission, the Panel on Contaminants in the Food Chain (CONTAM Panel) has provided this scientific opinion on the human health risks related to the presence of nitrosamines in food.

The opinion evaluates the toxicity of N-NAs to animals and humans, estimates the dietary exposure of the EU population to N-NAs and assesses the human health risks to the EU population due to the estimated dietary exposure.

"Overall, 32 N-NAs have been investigated for their presence in food. The CONTAM Panel identified and characterized the hazards for all of them. However, so far, the actual presence of quantifiable amounts in food was demonstrated for a limited number of these compounds," says the assessment.





“Therefore, the risk characterization was limited to ten carcinogenic N-NAs occurring in food (TCNAs), i.e. NDMA, NMEA, NDEA, NDPA, NDBA, NMA, NSAR, NMOR, NPIP and NPYR. N-NAs are the reaction products of nitrosating agents such as nitrites or nitrogen oxides and amino-based substances such as secondary amines and may be formed in a variety of foods under processing conditions in the presence of these reactants,” it continues.

**Mitigating nitrosamines**

While authorities decide on the best measures to take regarding nitrosamines, food companies are taking the lead in removing nitrites, despite them still being allowed as food preservatives. Nitrites are identifiable on packaging by the E250 label.

Food shelf life extension specialist Kemin Food Technologies has developed a nitrite alternative for use in the first stage of emulsified cooked sausages. Its product is available in the EMEA region and maintains product stability with active molecules from



plant extracts. Vaess, a company that produces bacon products, has removed nitrite from its products by using a brine compound. Japanese researchers have found that resveratrol from knotweed - a plant that grows quickly and is often seen as invasive - has the potential to replace nitrate preservatives.

In addition, researchers from the American Chemical Society have developed a colour-changing film that can be used to analyze nitrite levels in food quickly. Consumers can simply stick the film onto the food and use their smartphone to snap a picture. Taste and nutrition giant Kerry previously evidenced that nitrates are increasingly viewed as “no-no” ingredients.

EFSA’s opinion will be shared with the European Commission, which will discuss with national authorities what risk management measures are needed.

By Marc Cervera

**Online labels could increase healthy food consumption better than discounts, study finds**

29 Mar 2023  
Nutrition Insight

Grocery stores could increase their revenue by introducing self-

monitoring labels in an online shopping setting, suggests a new study. It further found that such marks, where consumers are reminded of their purchasing pattern of healthy foods, had a higher impact on consumer behaviour than discounts on healthy foods or comparing purchasing behaviour to other consumers.

The study looked into technology-enabled food labels with specific information that may help consumers commit to healthier food options over unhealthy ones, focusing on three nutritional food labels: self-monitoring, pre-commitment and social comparison. “Self-monitoring of previous healthy food choices might be more effective than pre-commitment based on



discounts for healthy food products,” according to the research. Self-monitoring and pre-commitment-based technology-enabled nutritional food labels might be more effective for

impulsive consumers than non-impulsive people.



The authors note that impulsive behaviours may lead to obesity. The World Obesity Federation has predicted that 51% of the world's population will be overweight or obese by 2035 if current patterns are unchanged.

### Online shopping experiment

The study, published in *Frontiers in Nutrition*, included 405 participants tested on impulsivity. They were asked to



choose one of three food baskets in an online experiment at hypothetical online grocery stores. Each food basket included different healthy food labels and indications on delivery time and price.

On self-monitoring behaviour, the authors state that "research suggests instructing individuals to actively record their choices may promote an increase in healthy food choices." Participants were told that by choosing this label, they would continue their "healthy streak," as it showed how many healthy orders they made in a row.

Pre-commitment refers to changing an immediate consequence of the individual

choice to choose larger-later rewards. If participants chose this label, they were told they would get a 10% discount on this and the subsequent purchase containing a minimum of 30% of fruits and vegetables.

Social comparison refers to situations where consumers tend to copy other people's behaviour when uncertain about what choices are correct in a given case. In the experiment, this label showed the percentage of groceries in a basket labelled as healthy compared to what other consumers in their area have bought, either +15% or -15%.

The researchers used the Traffic Light Food Labelling System to define what is "healthy," a front-of-package food labelling system used in the UK.

### Implementing self-monitoring labels

Companies might use self-monitoring labels to increase healthy food choices rather than providing a discount on healthy foods, thus saving costs. According to the researchers, developing healthy food labels based on self-monitoring principles might be relatively inexpensive. Online grocery stores can integrate information from customers' online accounts into point-of-sale moments. However, in doing so, companies must

consider customer privacy, data accuracy, ownership and accessibility.

Implementing technology-enabled nutritional food labels may generate more consumer engagement with online grocery stores. With these labels, companies can provide higher consumer well-being by not restricting their product options. The US Food and Drug Administration published draft guidance for food manufacturers on how and when to use Dietary Guidance Statements on food labels to help them promote good nutrition.

### Follow-up research key

The researchers point to the need for future research, as results might be specific for UK participants. Order effects and the sequence of introduction to the technology-enabled healthy food labels may also have affected choice behaviour, as did the price of the offer. According to the authors, additional research should investigate how these and other technology-enabled healthy food labels may impact actual purchases of healthy foods.

By Jolanda van Hal





## Anti-Innovation & Consumer Choice? Italy Moves to Ban Lab-Grown Meat, Cheese & Fish

By Oliver Morrison  
03-Apr-2023 - Food Navigator  
USA

Proposals put forward by Georgia Meloni's government, approved by ministers last week, would ban the production and placing on the market in Italy of so-called "synthetic foods" produced from animal cells without killing the animal. The draft law would apply to lab-produced fish and synthetic milk but singles out "meat which is the result of a cell cultivation process". It will reportedly introduce a fine of €10,000-€60,000 for any violation of the proposed ban.

"Laboratory products in our opinion do not guarantee quality, well-being and the protection of our culture, our tradition," said Minister Francesco Lollobrigida, a senior member of Prime Minister Giorgia Meloni's Brothers of Italy party. Neither the European Food Safety Authority nor its UK equivalent has yet received a novel food dossier from a company making cell-based meat.

But agriculture lobby Coldiretti said a ban on synthetic food is

needed to safeguard domestic production "from the attacks of multinational companies".

The government further claimed its proposals have the support so far of half a million signatures throughout the country and plans attracted a "flash mob" of supporters outside Meloni's office in Rome whose banners read "No to synthetic food", "A real porchetta is better than test-tube food", "Let's defend the Mediterranean diet", and "No to the oligarchs of artificial food".

"Italy, which is the European leader in quality and safety at the table, has a duty to lead the way in food policies to protect citizens and businesses," said Coldiretti, President of Ettore Prandini. "The young farmers, who have chosen to build their future in the countryside, would be the first victims of the spread of synthetic food, which aims to replace natural foods produced in the countryside with those made in the laboratory." But pro-cell-based meat campaigners said the proposals are anti-innovation, anti-consumer choice and anti-environment.

Alice Ravenscroft, head of policy at the Good Food Institute Europe, said: "The passing of such a law would shut down the economic

potential of this nascent field in Italy, holding back scientific progress and climate mitigation efforts, and limiting consumer choice.

"It could prevent Italian scientists from undertaking crucial work, and ban Italian cultivated meat start-ups from existing at all. Italy would be left behind as the rest of Europe and the world progresses towards a more sustainable and secure food system."

In December 2020, Singapore became the first country to grant regulatory approval to a cultivated meat product, and consumers have been eating it there since. Over the last four months, two separate cultivated meat products (from UPSIDE Foods and GOOD Meat) have successfully passed the United States Food and Drug Administration's pre-market safety review.

"The EU already has a robust regulatory process in place for confirming the safety of new foods like cultivated meat, and regulators in the United States and Singapore have already found it to be safe," Ravenscroft added. "The government should let Italians make up their own minds about what they want to eat, instead of stifling consumer freedom."





Peer-reviewed research has shown that cultivated meat could cause up to 92% less emissions than conventional beef, and governments across Europe are eager to unlock the potential benefits of cultivated meat. In 2022 the Netherlands announced €60 million of government funding towards research and development of cultivated meat and precision fermentation.

Meanwhile, the UK government announced a £16 million funding call for sustainable proteins, including cultivated meat, and in 2021, the Spanish government invested €5.2 million in a project investigating the potential for cultivated meat to help prevent diet-related diseases.

### Irresponsible on-pack claims tapping dietary trends poses health risk - Expert Panel

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

The irresponsible inclusion of prominent labels on food and beverage products to capitalise on current dietary trends and fads can pose immense health risks to consumers, especially if not



### backed up by proper research and data.

This was the conclusion of a panel of experts at the recent Gulfood 2023 event in Dubai, which convened Whole Earth Brands Director Rajnish Ohri, Kanira Founder and CEO Vishal Ramakrishnan and A Diabetic Chef Founder Harsh Kedia for this panel discussion dietary trends and health. Discussing the rise of various dietary trends and fads both in various regions from the Middle East to Asia Pacific ranging from keto diets to intermediate dieting, the experts all concurred that risk to consumers comes not only by blindly following fads without doing the proper research but also blindly believing food product labels related to these without checking the nutrition panel.

"A lot of these diets start out in the United States and are rooted in consumers looking for a set of principles on what to eat, what to follow, just seeking an easier way to eat and live healthier overall," Ramakrishnan said. "There tends to be research backing these up so that benefits can be delivered when done in the correct

way, and usually these start out with an initial wave of entrants with this intention in mind - but the major issues start when perhaps a big brand

enters this market to hop on the bandwagon of the trend, say keto, and starts slapping on keto labels on its products to capitalise. But oftentimes a thorough look at the nutrition panel will show that the ingredients may be in line with keto, but are not that healthy at all - so health ends up not being the point of focus here, and the label is just a play on consumer sentiment for marketing."



The keto diet is one where a dieter consumes very limited amounts of carbohydrates but instead focuses on high-fat foods, aiming to drive the body into ketosis where it burns fat for energy. Many studies have been conducted on keto dieting, and it is a trend with many followers and supporters - but due to the types of foods involved, it can also pose health risks if done incorrectly, e.g. by no means should a consumer with high cholesterol be eating even more fat.





The panel also highlighted another major issue with such on-shelf packaged products attempting to associate themselves with dietary trends and be perceived as 'healthy' in conjunction with this, being that many of these are processed products.

"No matter the type of food, there is no doubt that traditional, fresh foods are healthy when compared with processed items," Kedia said. "So if brands want to associate themselves with the health benefits these diets are said to convey, there needs to be more collated data sets in this regard, and the fact is that these are hard to find at the moment."

Ohri concurred, adding that big CPG brands need to be especially cautious in this regard due to the wide influence they have on consumers. "These big CPG brands play a very big role when it comes to population food consumption, and they need to have their messaging correct, as well as to make it easy to educate consumers in the right direction - for example, on reading the nutrition panel correctly," he said.

"These days the younger generation of millennial and

Gen Z consumers are much more particular about label reading, so there is now more consumer pressure on the brands to make their ingredient lists clear, understandable and exercise their responsibility to make products healthier."

### Millet Measures: India Sets New Food Safety Standards for Traditional Cereal in Anticipation of Production Boom

By Pearly Neo 05-Apr-2023 - Food Navigator Asia

India has implemented new comprehensive food safety and quality standards for millets in the country in anticipation of a production and demand boom as the United Nations has designated 2023 as the International Year of Millets.

Millets have long been a part of traditional Indian diets before falling out of style over the years as a staple in favour of more commercialised crops such as wheat and rice - but now the Indian government believes that revitalisation of the sector could be on the way in the wake of the UN dedicating 2023 to the cereal.

"Most millet crops are native to India, and they are highly tolerant to drought and other extreme weather conditions, requiring low chemical fertiliser or pesticide inputs," Food Safety and

Standards Authority of India (FSSAI) CEO Kamala Vardhana Rao said via a formal statement. Millets are also gluten-free, low in glycemic index (GI), rich in dietary fibre and in micronutrients including calcium, iron, phosphorus and more - these should ideally be an integral part of our daily diet.

With the UN General Assembly having declared 2023 as the International Year of Millets, 2023 will provide an opportunity to increase global production, improve processing efficiency and better use of crop rotation, as well as to promote millets as a major component of the food basket. As such, FSSAI has specified a comprehensive group standard this year for millets that has been notified in the Gazette of India and will be enforced on September 1 2023."





standard including moisture, uric acid, extraneous matter, defects, immature or shrivelled grains and more so as to ensure the standardisation of good quality millets across both the domestic and global

There are many variants of millets, and at present, only a few individual types are covered by food safety or quality standards under the law such as the more common sorghum and finger millets. The new standards now cover food safety and quality parameters for 15 types of millets, enabling legal action and consequences for food firms bringing unsafe or low-quality products into the food supply.

"The comprehensive food standard will apply to the millet variants amaranthus, barnyard millets, brown top millets, buckwheat, crab finger, finger millets, fonio, foxtail millets, Job's tears, Kodo millets, little millets, pearl millets, proso millets, sorghum and teff," the agency stated. Eight parameters will be monitored under this

markets. Both whole and dehulled millets will be subject to these standards [so as to] prevent any poisonous, toxic or noxious millets as well as any contaminations from entering the food system."

Basic requirements are for moisture content to be not more than 13% by mass, for immature or shrivelled grains to be not more than 5% by mass and uric acid content to be not more than 100mg/kg. The presence of other types of edible grains - usually cheaper types - in bags of millets and other more expensive grains is not uncommon in India, and in order to put a halt to this

FSSAI also included a clause specifying a 2% limit for these other edible grains.

In the same amendment to the national food safety standards to include the new millet standards, FSSAI also included an update on stevia standards to improve safety assessments. "All stevia products sold must contain no less than 95% purity of steviol glucosides when dried," the agency stated. "Several assays for purity assessment can be conducted

to ensure quality stevia is reaching the market, including a drying loss of no more than 6% at 105°C for two hours.



So far there are some 57 types of stevia products over seven groups that are listed in this update covering various rebaudiosides, steviosides and so on, but this list is not exhaustive and there may be more steviol glycosides that may have been identified in stevia leaf extracts in literature not included here."

