

PFNDAI Bulletin

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**Protein Foods and Nutrition Development
Association of India**

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Editorial

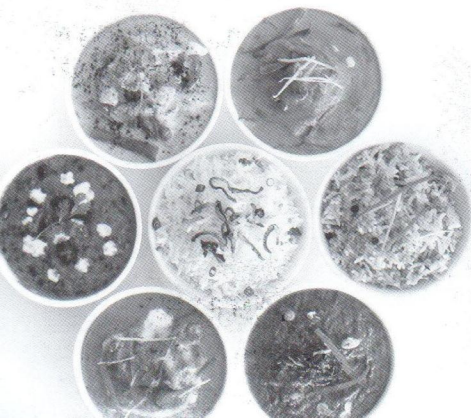


Some people want to consume only vegetarian foods for religious or some sentimental reasons. So in India and in some other countries there is a provision to label a food as vegetarian and non-vegetarian. Under the Food Safety & Standards Regulations 2011, Non-vegetarian Food has been defined as “an article of food which contains whole or part of any animal including birds, fresh water or marine animals or eggs or products of any animal origin, but excluding milk or milk products, as an ingredient.” The vegetarian food is defined as “an article of food other than Non-Vegetarian Food as defined (previously).” So whichever is not a non-vegetarian food, it is presumed to be a vegetarian food.

This also clearly excludes milk and milk products from being called non-vegetarian even though they are derived from animals.

The foods which have been defined as vegetarian or non-vegetarian have to be labelled with green or brown dot respectively to clearly emphasise that these belong to the particular group. The size and place of putting this is also given. Also not just labels but pamphlets, leaflets, advertisements about these foods in any media should also display these green or brown dots.

This rule has been exempted for mineral water or packaged drinking water or carbonated water or alcoholic drinks or liquid milk and milk powders. Thus these packages need not carry either green or brown dots.



Some confusion in the minds of either food safety officers or business operators

remains as to whether some substances derived from insects should have green or brown dot. They would wonder whether honey which is derived from honeybees.

In the US, one coffee company with coffee shop chain recently decided to drop use of natural red colour cochineal that was derived from insects. As some customers felt that their bakery products may contain parts of insect, the owners decided to withdraw it.

The British body, Food Standards Authority explains that the vegetarian foods as those which are derived without sacrificing or killing the animal. This is a clearer definition which would make milk and milk products to be vegetarian as well as honey which is derived without killing bees. Even eggs have been considered vegetarian as the birds are not killed to get them. However, many vegetarians would not approve of this definition although there is a large section of people who are vegetarians but consume eggs.

In India, there are concerns about use of vitamin D3 which is derived from animal source. The precursor of D3, 7-dehydrocholesterol obtained from sheep wool, when exposed to UV B light gets converted to vitamin D3. Thus there are questions about whether products containing vitamin D3 be labelled with green or red dot. Experts feel that when foods containing all vegetarian ingredients are fortified with nutrients from animal sources that should not change the food to non-vegetarian food. This would also allow omega-3 from fish oils to be used in vegetarian foods.

With season's greetings,

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Eggs Can Do That Too

There are many foods formulated with large number of chemical additives that the list of ingredients is frightening with all those chemical names or numbers. Modern consumers prefer the foods pure and simple. Egg products are simple although they can perform many complex functions in a food product. The table give the many functions the eggs are capable of and if these are used many additives may not be necessary.

20-Plus Functions of Eggs

Adhesion	Crystallization	Fortification	Richness
Aeration	Control	Freezability	Shelf Life
Antimicrobial	Drying	Gloss	Extension
Binding	Edible Packaging	Humectancy	Structure
Browning	Film	Insulation	Tenderization
Clarification	Emulsification	Moisturizing	Texture
Coagulation	Finishing	Mouthfeel	Thickening
Coating	Flavor	pH Stability	Whipping Ability
Color	Foaming	Protein Enrichment	

Direct from nature with a touch of modern technology that cracks, separates and packages convenient forms of whole eggs. Whites and yolks, egg products can replace many ingredients and additives. Consumers know that eggs are real food. They possess good-for-you image that is not possible with many chemically processed ingredients and additives. One foremost ice cream brand uses just five ingredients, one of which is eggs. Some of the many functions of eggs are discussed below.

Adhesion/Binding

Egg proteins, especially in whites, help with adhesion and ingredient binding. They coagulate when heated or exposed to acid, causing egg products to become semi-solid or solid and function as adhesive, holding together different ingredients. For example, slightly beaten egg whites with some water can be brushed onto the surface of baked foods. This sticky solution helps topically applied nuts or seeds stick to the surface during baking. Egg products are often added to batters used for breaded foods to help adhere breading to food. Protein levels of 10 to 15% tend to be most effective for binding.

Aeration/Foaming/Structure

Incorporating air into liquid or viscous solution entraps air into it forming foam. Is foam is stabilised by proteins, volume increases and density reduces, leavening the food. Viscosity of egg products is suitable for incorporating air by whipping or beating process. When it is continued, bubbles become smaller and their number increases while stabilised by egg proteins.

Liquid egg products with low surface tension orient their proteins with hydrophobic and hydrophilic ends contacting air and water securing air bubbles. During baking, proteins bind with each other forming a delicate yet reinforced network stabilising the foam structure. Egg whites are better than yolks because of the unique proteins in them. Egg whites are able to create the largest possible food foams. Foam can be 6 to 8 times greater in volume than unwhipped, non-aerated liquid egg white.

Whole eggs and yolks can also increase the volume of foods like baked goods, dairy desserts like ice cream and custard, but not as much as egg white alone. Egg white protein ovalbumin is responsible for original foam volume when egg whites are whipped, while ovomucin holds onto the air bubbles during heating and can stretch as bubbles enlarge.

Many factors affect the stability of egg white foams. If foam is overbeaten or whipped excessively, it dries out and sets preventing further expansion upon baking. If foam is kept for over 5 min, air starts escaping and finally it liquefies to original state. This can be prevented by adding a little sugar during foam preparation. Proper addition gives smooth, stable foam which does not collapse or drain but excess sugar or adding too rapidly may retard foaming.

Historically bakers used copper bowls to stabilise egg white foams where copper reacts to form conalbumin and helps stabilise protein during heating. Today they can be stabilised by adding cream of tartar i.e. potassium bitartrate. This lowers pH, causing increase in free-floating hydrogen ions in egg white. This helps stabilise foam much like copper.

Salt can decrease the foam stability by weakening the matrix of the protein bonds. Water can increase the volume and lightness of foam but there is a possibility of some liquid draining off due to dilution of proteins. In fact egg white diluted by 40% or more water cannot produce stable foam.

Temperature also affects development of egg white foam giving maximum volume if beaten at room temperature. Lower temperature gives lesser volume. Fat can be detrimental to egg white foam even in trace amount. As fat molecules have hydrophobic and hydrophilic ends similar to protein, they compete with protein for alignment of bubbles. Since fat does not bond with each other unlike proteins, they do not create any cross-linked bonds to reinforce the network of gas bubbles.

Antimicrobial

Lysozyme, a protein found in egg white can inactivate gram positive microorganisms. It prevents overgrowth of microbes in hard cheese production that causes a defect called "late blowing." It can also control lactic acid bacteria in wine production that may sour the wine. It is also used as a general preservative in select applications.

Browning/Colour

Protein in eggs can produce brown colour when exposed to heat due to Maillard reaction. Also egg yolk contains xanthophylls such as lutein and zeaxanthin which are carotenoids having yellow-orange colour giving the yolk the typical colour. This contributes rich colour to the products besides providing health benefits.

Clarification

Eggs, especially whites, can clarify various fluid products including consommé, broth and even wines. Fluids are heated and when egg white is added it coagulates, catching and holding tiny particles. Depending on size and weight of encased particles, the cooked whites may sink to bottom allowing clarified product to be slowly poured off. Some particles may float and may be skimmed off, resulting in crystal-clear product.

Coagulation/Thickening

Natural proteins are complex, folded and coiled molecules with loose bonds within holding each molecule. These bonds can be disrupted by heat, acid or whipping causing protein to denature and unfold. When such units come together forming network of such bonds, they coagulate changing from liquid to semi-solid or solid. Coagulation affects their ability to foam, seal, thicken etc.

There are 40 odd proteins in whole egg, some in white and others mostly in yolk. These proteins influence the rate of denaturation and coagulation. Different portions coagulate at temperatures between 62°C and 70°C. There are also many factors that affect the rate and ability to coagulate.

Coating/Drying/Finishing/Gloss/Humectancy/Insulation/Moisturising

Slightly beaten liquid egg products could be used in coating or glaze on baked goods. Glaze varies in appearance and texture. Yolks give golden colour, with the fat component preventing the product from drying out. White is the main source of proteins. When proteins coagulate, they help in adhesion as well as they create a seal. When whites are used separately, process of coagulation draws moisture that may evaporate eventually from product giving a crisp surface. Such an egg wash gives baked product a finished glossy look.

Crystallisation Control/Freezability

Smoothness on tongue is very pleasing and a quality factor in many foods. Egg whites function to interfere, disrupting sugar crystallisation and growth. In frozen foods like ice cream, egg yolk helps control density, hardness and texture by encouraging the formation of small ice crystals. This improves texture and acceptability of product.

Edible Packaging film

Transparent egg white films are suitable as water-soluble packets or pouches for food ingredients. There are applications in breath mint and strips.

Emulsification/Mouthfeel

Egg yolk proteins, lipoproteins and phospholipids are surface-active agents that can form emulsions of oil and water. Egg yolk emulsions affect the mouthfeel in two ways: its natural emulsifiers coat liquids with fat creating smooth, creamy texture e.g. in custards & chocolate truffles; secondly these emulsifiers also thicken e.g. in mayonnaise, one whole cup of tiny oil droplets in packed in two tablespoons of liquid producing thick spread.

Egg yolk whisked into heated sauce binds fats and liquids for slight thickening and improved texture. In ice cream, yolk helps disperse fat throughout the mix and prevents it from clumping. It also improves whipping properties for desired overrun and make ice cream dry and stiff.

Flavour

Though eggs contain more than 100 flavour components, overall it is bland. Yolks, however, carry and meld flavours used in foods. Eggs also provide well-rounded, yet neutral richness that can stand delicately on its own or without clashing, serve as a backdrop to allow strong flavoured foods or seasonings to shine.

Fortification/Protein Enrichment

Eggs and their products are considered nutrient-dense as they provide many nutrients for a relatively low-calorie count. They provide such nutrients as high-quality protein, trans fat-free mono- and poly-unsaturated fats, vitamins, minerals and other highly bioavailable nutrients with recognised health benefits. Egg protein contains all essential amino acids giving a biological value of 93.7 on a 100-point scale.

Lipid portion is found mostly in yolk and has 5% of daily value of vitamin D needed for bone health. It is a source of lutein and zeaxanthin, the xanthophylls carotenoids useful in eye health. Lipid portion also contains choline, the nutrient necessary for normal functioning of cells and whose requirement goes up in pregnancy.

pH Stability

Egg white is among few naturally alkaline foods with pH of about 7.6 which may go up during storage. Egg yolk has pH about 6.0. Refrigerated storage slows down change in pH. The egg pH does not disrupt the pH of food formulations.

Richness

Yolk adds richness to all types of foods while adding colour, emulsification, flavour and whipping ability.

Shelf Life Extension

Egg proteins bind water, making water less available for microbes to grow and cause spoilage, as well as prevent certain foods, such as baked goods from drying out.

Tenderisation/Texture

Food texture not just limits to its feel in hand and mouth, but encompasses sensory experience of chewing and swallowing. Egg products can impact all of these variables. For example, fats in yolk produce a more tender, softer crumb in baked goods and retard the onset and rate of firming or staling. Egg proteins can help maintain product moisture by binding the water in the structure, thus preventing drying out. Thus there are textural benefits like chewiness that helps improve mouthfeel.

Whipping Ability

Egg yolk solids increase the rate of whipping in ice cream, particularly in slow whipping mixes. Usually less than 0.5% egg yolk solids are needed in mix for this. They are basically desirable where butter or butter oil is used as a main source of fat. Research has shown that yolk or whole eggs improve rate of whipping more if they are sweetened with 10% sugar or corn syrup before they are frozen or dried.

The Final Touch

Egg products provide that final touch to many baked goods. When slightly beaten, liquid egg product can be used as a coating or a glaze on baked goods. The egg mixture is brushed on the surface of breads, cookies, pastries, rolls, etc., prior to baking, or applied about 15 minutes before the end of baking to prevent over browning. The following equations apply:

- EGG + SALT** = Shiny surface
- EGG + MILK** = Medium-shiny surface
- EGG + WATER** = Less-intense shine, golden surface
- EGG YOLK + WATER** = Shiny-golden surface
- EGG YOLK + CREAM** = Shiny-brown surface
- EGG WHITE** = Light-colored, crisp surface
- EGG WHITE + WATER** = Sticky surface for adhering nuts and/or seeds
- EGG WHITE + MILK** = Transparent-shiny surface

Many Egg Product Options

Many egg products are available for use in food formulations. They include frozen, refrigerated liquid or dried forms. They can be whole egg, or just the whites or yolks. Sometimes additional ingredients are used for functional purposes e.g. in improving whipping ability.

Condensed from article by Donna Berry in American Egg Board



Application of Enzymes in Dairy Processing and Effect on Nutrition

By Dr. Malathy V., Food Technologist, PFNDAI

Milk is one of the richest sources of protein. This also makes it a highly perishable product. Milk is preserved by processing. Pasteurization is used when milk is to be stored and used as such or processed into products such as yoghurt, cheese, butter and ghee.

Indigenous enzymes in milk

Milk contains some indigenous enzymes principally protein degrading enzymes (proteases) along with inhibitors. The enzymes are in an inactive state due to the inhibitors. Seven indigenous enzymes have been identified in milk; Lacto peroxidase (LPO), catalase, xanthine oxidase, proteinases (proteases), lipase (lipoprotein lipase, LPL), salolase (arylesterase) and amylase.

The principal proteinase in milk is plasmin, a heat-stable enzyme with a relatively broad specificity on the caseins. It exists in milk as a component of a complex system. Other proteinases (e.g., elastase and cathepsin B) are also known to be present in milk. A number of peptides have been identified in freshly-drawn bovine milk which originate from the action of plasmin (different peptides have been grouped into several fractions, i.e., the proteose peptones, (which includes lactoferrin) the γ gamma-caseins and the I-caseins). Any stress applied to milk disturbs the complex proteolytic system of enzymes.

Altering the temperature of the system, e.g., by refrigeration or treatment at a higher temperature (e.g. during pasteurization), exposes the components of the system to conditions it was never intended to encounter, and significant effects on activity are, therefore, not surprising. For example, pasteurisation of milk inactivates inhibitors of plasmin activators, resulting in a net increase in plasmin activity in pasteurised milk. The increasing use of milk protein-derived products in processed foods warrants further study of the implication of enzymes coincidentally added with such protein fractions for the quality of the resulting products.

The enzymes of psychrotrophic (cold temperature growing) bacteria are probably active and significant during cold storage of milk. The two sets of enzymes (bacterial and indigenous) may, in fact, interact. A potentially interesting recent research strategy in this regard has been the use of cultures of lactic acid bacteria that have been genetically modified to express plasmin and thereby potentially accelerate proteolysis in cheese during ripening.

In addition, milk constituents can act under certain circumstances as inhibitors of indigenous enzymes; for example, native and denatured beta-immunoglobulin inhibit plasmin, B-Casein and lactoferrin inhibit cysteine proteases. Inhibitors in milk or whey can influence the quality of dairy products made therefrom; for example, the ripening of cheese containing whey proteins is influenced by the presence of whey-derived protease inhibitors. Overall, it is likely that further study of inhibitors in milk will reveal more about the control and activity of indigenous proteinases.

Contribution of enzymes from rennet, starter bacteria and milk to cheese

Processing of cheese involves controlled hydrolysis of milk protein using rennet (either animal source or microbial). The hydrolysis product is then separated from water and pressed to give the final product. Protein hydrolysis influences the flavour of the cheese by its products directly due to

amino acids and peptides formed. These products can also act as precursors for other characteristic taste and aroma components. Moreover they are responsible for certain flavour defects of the cheese, especially bitterness which is caused by hydrophobic peptides. Proteolysis, therefore, is a determinative process for the quality of nearly all ripened cheese types, whether a short-ripened soft type of cheese, like Camembert, or a long-ripened hard variety like Cheddar cheese.

The source of protein hydrolyzing enzymes in processing of cheese could be from various sources.

Indigenous proteases; Cow's milk was shown to contain a protein hydrolyzing enzyme system of non-bacterial origin that survives pasteurization of cheese.

Non-starter micro-organisms or their enzymes. These organisms can originate from the raw milk or enter the cheese by multifarious and haphazard contamination during manufacture

Lactic acid bacteria used as starter cultures Starter cultures used for maintenance of pH during cheese manufacture contribute to flavour compounds in the cheese. Acetate, an important flavour compound in many cheeses is formed from lactose by lactic acid bacteria (LAB)

Rennet: The animal rennet used in cheese making is a crude enzyme extract from calf stomachs that may contain impurities of other proteolytic enzymes than rennin (e.g. pepsin).

Because different proteolytic enzymes act together, one would expect that during

cheese ripening a mixture of breakdown products would develop with different molecular weights, ranging from hardly attacked casein fractions to the small amino acids.

Lipases (fat hydrolyzing enzymes): Lipases in cheese originate from six sources: the milk, rennet preparation (rennet paste), starter, adjunct starter, non-starter bacteria and, if used, exogenous lipases. Milk fat contains high concentrations of short- and intermediate-chain fatty acids which, when liberated by enzyme hydrolysis, contribute directly to cheese flavour.

Application of lactose degrading enzyme lactase in dairy industry

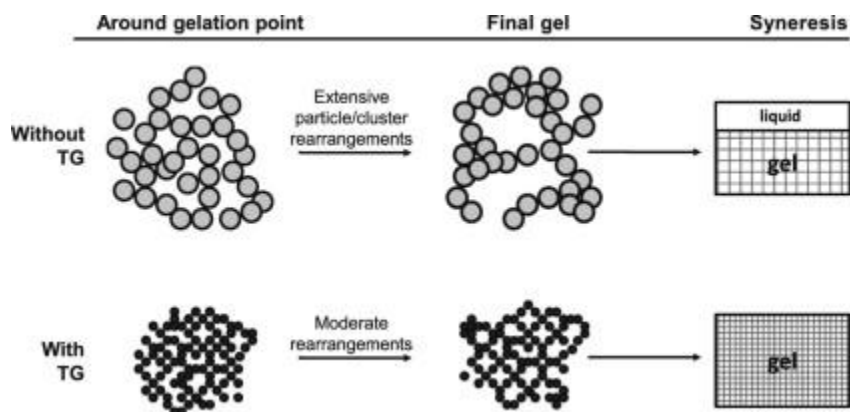
Lactase is the enzyme catalyzing the hydrolysis of lactose, the milk sugar. The enzyme is produced by starter cultures or is added exogenously during processing of dairy products. Lactase is used for manufacture of lactose free milk given to lactose intolerant persons. Another advantage of lactase treated milk is increased sweetness thereby obviating requirement of added sweeteners in the manufacture of flavoured milk or yoghurt. Manufacturers of ice cream, yoghurt and frozen desserts use lactase to improve scoop creaminess, sweetness and digestibility, to reduce sandiness due to crystallized lactose in concentrated preparations.

Newer applications of enzymes in dairy processing'

Transglutaminase is an enzyme which catalyzes cross linking of amino acids in proteins. Recently research on the application of this enzyme in dairy processing has gathered attention. The enzyme known as "meat glue" due to its application in meat processing can also be used to thicken milk and yogurts by making their proteins longer and denser. The effect of milk protein polymerization prior to yoghurt fermentation process was evaluated by enzymatic reaction with microbial transglutaminase. Treatment with the enzyme transglutaminase contributed to prevention of syneresis (i.e. tendency of liquid separation from yogurt during storage) and increased the consistency index in yoghurt samples. Stability of reconstituted milk powders in tea or coffee is a routine test in the selection of milk powders for use as tea or coffee whiteners. While UHT-sterilized

milks and UHT-sterilized products containing milk are susceptible to coagulation during sterilization and gelation or sedimentation during storage, any positive effects on the stability of these products would be economically important. In a study it was found that the heat stability of reconstituted transglutaminase-treated skimmed milk improved significantly. This effect of the enzyme suggests that this enzyme may have potential commercial applications as a food-grade additive.

Effect of transglutaminase (TG) on curd formation



Some other enzymes are reported to have beneficial effects in dairy processing.

The "cooked" flavor of milk produced by heat treatment due to production of sulfhydryl compounds could be removed by treatment with immobilized sulfhydryl oxidase enzyme. This has application in small scale processing of milk for production of khoa and condensed milk or milk sweets.

Cow's milk can be provided with antibacterial properties by addition of lysozyme enzyme. This enzyme can act as a preservative while not interfering with lactic acid bacterial growth. Glucose oxidase has been used for preservation of cheese by coating inside the wrapper. Along with catalase, the enzyme prevents growth of microorganisms during storage

Recently there is a trend to use the natural spoilage protective enzyme lactoperoxidase to improve shelf life of fresh milk. This is possible if processing and packing is done in such a manner as to prevent degradation of the lactoperoxidase system.

Active research in dairy processing in various countries may soon facilitate not only use of indigenous enzymes in milk optimally but also use more enzymes and their combination for maximum utilization of this natural resource.

Research in Health & Nutrition

Specific Cinnamon Variety Promotes Health Better

December 31, 2013 Food Product Design

Consumption of cinnamon can cause a significant decrease in levels of fasting plasma glucose, making it a powerful player for type 2 diabetics and those at risk of developing the disease. However, not all cinnamon should be treated equal, as one variety may be more healthful.

Researchers at Western University of Health Sciences conducted a meta-analysis of 10 randomized controlled trials (RCTs) to determine cinnamon's effect on glycemia and lipid levels.

According to the study, recently published in the journal *Annals of Family Medicine*, cinnamon not only decreases fasting plasma glucose, but can also lower total cholesterol, LDL-C and triglyceride levels, and increase HDL-C levels.

However, the most common variety of cinnamon, cassia, may not be the best option for those trying to increase intake for health reasons. Cassia contains coumarin, a naturally occurring ingredient that can cause liver damage in a small group of individuals sensitive to it.

Coumarin as an additive or as a constituent of tonka beans or tonka extracts is banned from food in the United States due to its potentially adverse side effects. However, coumarin in food from other natural ingredients is not regulated.

While cassia is often more cost-effective and more readily available, investing in Ceylon cinnamon may be a better option. Ceylon or "true cinnamon" refers to the dried inner bark of *Cinnamomum verum*. Ceylon cinnamon contains very little coumarin; however, cassia cinnamon can contain larger amounts.



Unhealthy Cholesterol Levels Increase Alzheimer's Risk

December 31, 2013 Food Product Design

Unhealthy patterns of cholesterol could be directly causing the higher levels of amyloid known to contribute to Alzheimer's, in the same way that such patterns promote heart disease, according to a new study published online in *JAMA Neurology*.

Researchers at UC Davis found high levels of "good" cholesterol and low levels of "bad" cholesterol are correlated with lower levels of the amyloid plaque deposition in the brain that is a hallmark of Alzheimer's disease, in a pattern that mirrors the relationship between good and bad cholesterol in cardiovascular disease.

"Our study shows that both higher levels of HDL—good—and lower levels of LDL—bad—cholesterol in the bloodstream are associated with lower levels of amyloid plaque deposits in the

brain," said Bruce Reed, lead study author and associate director of the UC Davis Alzheimer's Disease Centre.

The relationship between elevated cholesterol and increased risk of Alzheimer's disease has been known for some time, but the current study is the first to specifically link cholesterol to amyloid deposits in living human study participants.

In the United States, cholesterol levels are measured in milligrams (mg) of cholesterol per decilitre (dL) of blood. For HDL cholesterol, a level of 60 mg/dl or higher is best. For LDL cholesterol, a level of 70 mg/dL or lower is recommended for people at very high risk of heart disease.

Charles DeCarli, director of the Alzheimer's Disease Centre and an author of the study, said it is a wake-up call that, just as people can influence their late-life brain health by limiting vascular brain injury through controlling their blood pressure, the same is true of getting a handle on their serum cholesterol levels.

"If you have an LDL above 100 or an HDL that is less than 40, even if you're taking a statin drug, you want to make sure that you are getting those numbers into alignment," DeCarli said. "You have to get the HDL up and the LDL down."

The study was conducted in 74 diverse male and female individuals 70 years and older who were recruited from California stroke clinics, support groups, senior facilities and the Alzheimer's Disease Centre. They included three individuals with mild dementia, 33 who were cognitively normal and 38 who had mild cognitive impairment.

The participants' amyloid levels were obtained using a tracer that binds with amyloid plaques and imaging their brains using PET scans. Higher fasting levels of LDL and lower levels of HDL both were associated with greater brain amyloid—a first-time finding linking cholesterol fractions in the blood and amyloid deposition in the brain.

"This study provides a reason to certainly continue cholesterol treatment in people who are developing memory loss, regardless of concerns regarding their cardiovascular health," Reed said. "It also suggests a method of lowering amyloid levels in people who are middle aged, when such build-up is just starting. If modifying cholesterol levels in the brain early in life turns out to reduce amyloid deposits late in life, we could potentially make a significant difference in reducing the prevalence of Alzheimer's, a goal of an enormous amount of research and drug development effort."



Milk may serve as a protective carrier of bioactive molecules

Polyphenols found in tea manifest anti-cancer effects but their use is limited by poor bioavailability and disagreeable taste. A study published in the *Journal of Dairy Science* shows that when epigallocatechin gallate (EGCG), the major extractable polyphenol in green tea and the most biologically active, is diluted in skim milk or other milk complexes, it remains bioactive and continues to reduce colon cancer cell proliferation in culture at concentrations higher than 0.03 mg of EGCG/mL.

“These results support a new role for milk as an ideal platform for delivery of bioactive compounds and opens the door to a new generation of dairy products providing additional benefits to human health,” said authors Sanaz Haratifar and Milena Corredig, University of Guelph, Ontario, Canada.

The majority of extractable polyphenols in tea are flavan-3-ols, commonly referred to as catechins. EGCG is the major catechin found in tea. Tea polyphenols have been shown to inhibit tumor formation, reduce cancer cell proliferation, increase normal cell death (apoptosis), and/or suppress the formation of new blood vessels feeding tumours (angiogenesis). For several reasons, tea catechins have poor bioavailability and the goal of the current study was to encapsulate EGCG in casein (milk protein) molecular aggregates, known as micelles, to maintain and enhance catechin bioavailability.

In one experiment, human colorectal cancer cells (HT-29) were grown for 24 hrs in the presence of EGCG in water or dispersed in milk. The number of living cancer cells (cell viability) was measured, and it was shown that EGCG reduced cell viability in a dose-dependent fashion although at higher concentrations (0.15 mg/mL and above), the antiproliferative effect of EGCG in water was greater than in milk.

Another experiment evaluated cancer cell proliferation after EGCG was added to different milk products, including skim milk, milk whey, and milk serum. While some differences were noted in cell proliferation at lower concentrations between EGCG in control medium and EGCG diluted in the milk components, at higher EGCG concentrations (0.8 mg/mL and above), EGCG reduced cancer cell growth by 80% or more, whether diluted in milk or not.

“In order to exert their biological health benefits in vivo, polyphenols must be available and still active, even when present in a food matrix,” said Haratifar. “This study showed that the binding of EGCG to the casein micelles did not affect the bioefficacy of EGCG and cell uptake at concentrations higher than 0.03 mg of EGCG/mL of skim milk.”

IFT Weekly January 2, 2014



Dietary fibre intake may lower risk of heart disease

A study published in *BMJ* shows that greater dietary fibre intake may be associated with a lower risk of both cardiovascular disease (CVD) and coronary heart disease (CHD).

Researchers reviewed literature published since 1990 in healthy populations concerning dietary fibre intake and CVD risk. They took data from six electronic databases. Cohorts of data were used from the U.S., Europe, Japan, and Australia. They looked at the following fibre intake: total, insoluble (whole grains, potato skins, etc.), soluble (legumes, nuts, oats, barley, etc.), cereal, fruit, vegetable, and other sources.

Results from analyses of total, insoluble, fruit, and vegetable fibre intake showed that the likelihood of a CVD or CHD event steadily lowers with increasing intake. In soluble fibre, a higher reduction was seen in CVD risk than CHD risk and for cereal fibre, the reduced risk of CHD was stronger than the association with CVD. A significantly lower risk of both CVD and CHD was observed with every additional 7 g per day of fibre consumed. The researchers say these findings are aligned with

current recommendations to increase fibre intake and demonstrate a large risk reduction with an achievable increase in daily fibre intake and this could “potentially impact on many thousands of individuals.”

They add that an additional 7 g of fibre can be achieved through one portion of whole grains (found in bread, cereal, rice, pasta) plus a portion of beans/lentils or 2–4 servings of fruit and vegetables.

The researchers conclude that “diets high in fibre, specifically from cereal or vegetable sources ... are significantly associated with lower risk of CHD and CVD and reflect recommendations to increase intake.” Greater intake from fruit fibre was associated with lower CVD risk. They recommend further work on the association with soluble or insoluble types of fibre.

IFT Weekly January 2, 2014



Ferrous bisglycinate may prevent iron deficiency in pregnant women

A study published in the *Journal of Perinatal Medicine* shows that a low dose of ferrous bisglycinate (*Aminojern*, a product containing Albion’s *Ferrochel*) may be equivalent to a higher dose of ferrous salt with regard to hematological and iron status when used by expectant women. This finding is important for the prevention of iron deficiency and iron deficiency anemia that often coincides with pregnancy.

One of the greatest challenges for pregnant women is maintaining adequate iron levels from conception and throughout gestation. Iron is critical for maintaining a woman’s red iron cell stores and to properly support development of a fetus. With the bioavailability of different iron forms varying so greatly and the preference for lower dose iron supplementation gaining acceptance, the researchers sought a comparison of different iron forms and doses.

In this peer-reviewed study, ferrous bisglycinate was taken by 80 Danish pregnant women throughout their pregnancy with measurements taken at 15–19, 27–29, and 36–37 weeks. Women were assigned to either a group that took a 25 mg dose of a ferrous bisglycinate elemental iron per day or a control group using a 50 mg dose of ferrous sulfate elemental iron per day for the designated time period.

The researchers found that participants who received the low dose ferrous bisglycinate benefitted equally to that of the control group with less gastrointestinal complaints. In addition, the newborn weight for the ferrous bisglycinate group was slightly higher than the control group.

Conclusions from the study suggest that adequate prevention of iron deficiency or iron deficiency anemia can be achieved using a low dose of ferrous iron from 15–19 weeks of gestation with appreciable side effects such as lower gastrointestinal distress and healthier baby birth weights. These findings are very important in women with a preference or greater tolerance for a lower dose of iron.

IFT Weekly January 2, 2014



Healthier kid's meal choices may impact calorie intake

A study published in the *Obesity Journal* shows that children can eat a favourite fast-food meal and still cut calories. In 2012, McDonald's made changes to its Happy Meal to improve the nutritional quality of the children's meal. Cornell University's Food and Brand Lab researchers Brian Wansink and Andrew Hanks analyzed more than 230,000 transactions from 30 representative McDonald's restaurants to document whether the change led to more healthful meal selections.

Historically, the Happy Meal has included one of three entrée options, a side item, and a beverage. By April 2012, all U.S. restaurants made several changes to the Happy Meal, including serving a "kid fry" that had 56% fewer calories than the previous Happy Meal fries. The change also added a packet of apples to each Happy Meal. All together, the children's meals now contain an average of 104 fewer calories.

The researchers found that the children did not compensate for the 104-calorie reduction by choosing a higher caloric entrée. Purchases of regular soda also decreased by 11%, while 22% more children chose white or chocolate milk.

"In addition to better nutrition, offering a small French fry portion and making apple slices part of the meal positively reinforces healthy behaviors and helps children consider fruit as a standard side item for lunch or dinner," said Wansink.

IFT Weekly January 2, 2014



Zero-calorie sweeteners may react the same as water in gut

A study published in *Diabetes Care* shows that zero-calorie artificial sweeteners may generate the same neutral reaction in the gut as water does on the glucagon-like peptide-1 hormone, which is tied to gastric emptying and appetite.

Intestinal exposure to glucose stimulates the release of glucagon-like peptide-1 (GLP-1), slows subsequent gastric emptying, and reduces appetite. These responses are signalled, at least in part, by intestinal "sweet taste receptors" (STRs), including taste receptor type 1 members 2 and 3 (T1R2, T1R3), and their cellular signalling partners alpha-gustducin and transient receptor potential cation channel subfamily M member 5 (TRPM5). In this study, the researchers evaluated whether oral administration of sucralose and acesulfame potassium (Ace K) would augment the GLP-1 response to oral glucose and modulate gastric emptying or glycemia in healthy humans.

The researchers recruited 10 healthy males, who were studied on four occasions each, separated by ≥ 3 days, in single-blinded randomized fashion. After an overnight fast, each subject consumed either 240 mL water alone or equivalently sweetened with 1) 52 mg sucralose, 2) 200 mg Ace K, or 3) 46 mg sucralose plus 26 mg Ace K. Ten minutes later, each drank 75 g of glucose, made up to 300 mL with water, and containing 150 mg ^{13}C -acetate. Blood glucose (glucometer), plasma insulin (ELISA), total GLP-1 (radioimmunoassay), and gastric emptying (breath test) were evaluated over 240 min.

Blood glucose, plasma insulin, and total GLP-1 concentrations did not change after water or sweetened drinks, prior to glucose ingestion, but all increased after oral glucose, without any difference between the four days.

These results differ from a previous study (Brown et al.) in which oral ingestion of “diet soda,” containing both sucralose (46 mg) and acesulfame potassium (Ace K) (26 mg), augmented GLP-1 release by more than one-third after an oral glucose load given 10 min later compared with carbonated water. This study’s results suggest a potential synergy between artificial sweeteners and glucose in stimulating GLP-1 secretion. The researchers of the current study note that the use of diet soda contains a number of substances, including caramel colour, gum acacia, natural flavours, citric acid, potassium benzoate, phosphoric acid, and potassium citrate, that were not controlled for.

The current study’s results differed from the Brown et al. study despite both using identical doses of sucralose and Ace K and the same load and timing of the subsequent glucose drink. The researchers conclude that it is unclear whether other components of diet soda that were not controlled for by Brown et al. may have had the capacity to stimulate GLP-1 secretion. However, the current findings show that sucralose or Ace K alone has no effect on GLP-1 secretion, insulin, or blood glucose concentrations and that sucralose has no effect on GLP-1 secretion or the glycemic response to intraduodenal glucose in healthy humans.

IFT Weekly January 2, 2014



Omega-3 DHA may help reduce energy intakes, but does this affect body weight?

Nutra-Ingredients 03-Jan-2014

Twelve weeks of supplementation with the omega-3 fatty acid DHA may help reduce energy intakes in overweight and obese women, but the effects of this on body weight are uncertain.

Researchers from the University of Sheffield and Obsidian Research Ltd in the UK found that, while the DHA supplements did not statistically reduce body weight, compared to the control group receiving oleic acid-rich oil, the loss of body weight did “*approach statistical significance*”.

“Clinically relevant weight loss is 5% initial body weight, and in the present study, 39% of the subjects in the DHA group achieved this, compared with 7% in the [oleic acid-rich oil] group,” wrote the researchers in *Nutrition Research* .

“Although the between-treatment differences in those who achieved 5% initial body weight were not statistically significant, our results compare favourably with a clinically approved treatment (orlistat) for obesity, where 33% of subjects lost 5% initial bodyweight over a 1-year period.”

Study details

Charlotte Harden and her co-workers recruited 40 overweight and obese women to participate in their double-blinded, randomized, parallel study, with 27 women completing the full 12-weeks. The

women were randomly assigned to receive 45% oil-in-water emulsions, containing predominantly DHA or oleic acid.

Results showed that women in the DHA group consumed significantly less energy, and fewer grams of carbohydrate and fat than the control group.

While no statistically significant differences were obtained for body mass and composition, there was trend toward significance in the DHA group, said the researchers.

Commenting on the potential mechanisms, Harden and her co-workers said that omega-3s may be acting on the expression of genes, with other studies reporting that the fatty acids may down-regulate the expression of genes involved in the growth of fat cells in fat tissue, as well as up-regulating gene expression for fatty acid oxidation.

DHA may also be modulating appetite by stimulating satiety hormones, they said, or via pathways to decrease the reward associated with food intake.

“Additional, longer-term, and adequately powered studies using subjects of both sexes are needed,” they wrote. “Other factors that should be considered include the following: the choice of n-3 PUFA-free emulsion, the BMI category of subjects, and ways of improving the compliancy and accuracy of dietary assessment.”



Researchers tout cholesterol-reducing dark chocolate with phytosterols

Nutra-Ingredients 03-Jan-2014

Phytosterols can be added to dark chocolate to produce a cholesterol-cutting product capable of an FDA health claim, according to a study.

Research published in the *LWT - Food Science and Technology* journal by Botelho *et al.* found that dark chocolate enriched with phytosterols maintained its functionality during storage and was capable of a US Food and Drug Administration (FDA) health claim on reduced cholesterol.

Functional food with health claim

“The dark chocolate bars developed in this study kept their potential functionality after five months of storage at room temperature, representing an option as a functional food,” said the researchers.

“...The daily intake of one bar (30 g) provided about 2.2 g of phytosterol esters, that is higher than the amount required by the FDA (1.3 g). In addition, the chocolate bar developed in this study did not contain sugar and was formulated with 50 g/ 100 g of cocoa, becoming an interesting option for individuals with dyslipidemia, type 2 diabetes or metabolic syndrome.”

What are phytosterols?

Phytosterols are natural compounds found in seeds, cereals and vegetable oils and have a similar structure to cholesterol. They can displace cholesterol in the intestine, thereby reducing cholesterol absorption. In the US, the Food and Drugs Administration (FDA) allows a health claim for functional foods with at least 0.65 g of vegetable oil sterol esters, eaten twice a day with meals for a daily total intake of at least 1.3 g.

The European Food Safety Authority (EFSA) has also approved a health claim to say phytosterols - or plant sterols - reduce cholesterol levels. But the claim only applies to yellow fat spreads, dairy products, mayonnaise and salad dressings containing phytosterols*.

The bars

Cholesterol lowering phytosterols, which includes plant stanols have gained traction in Europe through use in Benecol spread. The research team, led by scientists at the University of Sao Paulo, Alma Mater Studiorum-Università di Bologna and Brazilian functional foods company ChocoLife, developed 30g Belgian praline bars containing either palm oil or 2.2g of phytosterols in the filling.

They used ADM Natural Health and Nutrition's phytosterols brand CardioAid™-S. The bars were sugar-free and used xylitol, erythritol, maltitol and sucralose to provide sweetness and bulking. The phytosterol-enriched chocolate also contained ascorbic acid and tocopherol in the filling. The bars were packaged in in metallic BOPP (biaxially oriented polypropylene) film and stored for five months.

Phytosterols remained active

The researchers had hypothesized that the phytosterols would oxidize over time and reduce the functionality of the product. However, the bioactivity of the phytosterols was maintained during storage (at 20°C and 30°C) despite some oxidation.

The chocolate bars kept their colour for 90 days of storage, then started to become lighter - an early sign of fat bloom. The authors said that chilling or freezing the chocolates could reduce the risk of fat bloom. However, the changes in colour did not impact sensory acceptability. Sensory analysis was conducted by an untrained panel of 30.

Earlier research

Gregory Drew, director of the food & beverage group at Pharmachem, which helps confectioners incorporate functional ingredients into new products, previously told Confectionery News that phytosterols were growing in popularity. He said they were "*relatively plug and play*" for chocolate, requiring few special formulation provisos.

Earlier research has also suggested potential in chocolate. In 2008, a Mars-funded study found that the company's sterol-imbued chocolate bars lowered cholesterol by 2% and LDL cholesterol by 5.3% after an eight-week trial.



Vitamin E May Delay Alzheimer's Decline

January 2, 2014 Food Product Design

Alpha tocepherol, fat-soluble vitamin E and antioxidant, may slow functional decline—problems with daily activities such as shopping, preparing meals, planning and travelling—in patients with mild-to-moderate Alzheimer's disease, according to a new study published in the *Journal of the American Medical Association*.

Researchers at Icahn School of Medicine at Mount Sinai and Veterans Administration Medical Centres examined the effects of vitamin E and memantine in a group of 613 patients with mild-to-moderate Alzheimer's disease.

Patients were administered either vitamin E 2,000 IU/d, 20 mg/d of memantine, the combination or placebo and were then examined based on the Alzheimer's Disease Cooperative Study/Activities of Daily Living (ADCS-ADL) Inventory Score. Alzheimer's disease cognitive, neuropsychiatric, functional and caregiver measures were secondary outcomes.

"This trial showed that vitamin E delays progression of functional decline by 19% per year, which translates into 6.2 months benefit over placebo," said Mary Sano, Ph.D., trial co-investigator and professor in the department of psychiatry, Icahn School of Medicine. There was no added benefit for memory and cognitive testing with the vitamin.

Vitamin E is inexpensive and easy to obtain. The clinical trial investigators believe it can be recommended as a treatment strategy, based on the study findings.

"This study is the first to show an added benefit for vitamin E in mild-to-moderate disease," said Kenneth Davis, M.D., chief executive officer and president, Mount Sinai Health System. "Now that we have a strong clinical trial showing that vitamin E slows functional decline and reduces the burdens on caregivers, vitamin E should be offered to patients with mild-to-moderate Alzheimer's disease."

In 2011, Ohio State University researchers found that vitamin E, in the form of alpha-tocotrienol, can also trigger production of a protein in the brain that flushes toxins from nerve cells, preventing those cells from dying after a stroke. The findings, published in the journal *Stroke*, suggest natural vitamin E may be more potent than drugs targeting single mechanisms for preventing stroke-induced brain damage. In addition, vitamin E may help alleviate obesity-related liver disease and boost heart health in former smokers.



7 ways to snack smarter

Have you upgraded your snacks in the interest of more healthful eating? Perhaps you've traded in your afternoon candy bar for an energy bar or have become a fan of baked potato chips or fat-free ice cream. Maybe you're willing to pay a little extra when the label says "organic" or "natural."

It's a great idea to choose snacks wisely. But many foods that seem to be a great nutrition value aren't. Bran muffins and cereal bars can be packed with unhealthy fats and added sugar. Fat-free foods often contain lots of added salt and sugar.

Here are 7 tips for smarter snacking.

1. **Go for the grain.** Whole-grain snacks — such as whole-grain low-salt pretzels or tortilla chips and high-fiber, whole-grain cereals — can give you some energy with staying power.
2. **Bring back breakfast.** Many breakfast foods can be repurposed as a nutritious snack later in the day. How about a slice of whole-grain toast topped with low-sugar jam? Low-sugar granola also makes a quick snack.
3. **Try a “hi-low” combination.** Combine a small amount of something with healthy fat, like peanut butter, with a larger amount of something very light, like apple slices or celery sticks.
4. **Go nuts.** Unsalted nuts and seeds make great snacks. Almonds, walnuts, peanuts, roasted pumpkin seeds, cashews, hazelnuts, filberts, and other nuts and seeds contain many beneficial nutrients and are more likely to leave you feeling full (unlike chips or pretzels). Nuts have lots of calories, though, so keep portion sizes small.
5. **The combo snack.** Try to eat more than one macronutrient (protein, fat, carbohydrate) at each snacking session. For example, have a few nuts (protein and fat) and some grapes (carbohydrates). Try some whole-grain crackers (carbohydrates) with some low-fat cheese (protein and fat). These balanced snacks tend to keep you feeling satisfied.
6. **Snack mindfully.** Don't eat your snack while doing something else like surfing the Web, watching TV, or working at your desk. Instead, stop what you're doing for a few minutes and eat your snack like you would a small meal.
7. **You can take it with you.** Think ahead and carry a small bag of healthful snacks in your pocket or purse so you won't turn in desperation to the cookies at the coffee counter or the candy bars in the office vending machine.

Health Beat, Harvard Medical School January 9, 2014



Exercise Not Effective Against Teen High Fat Diets

January 13, 2014 Food Product Design

Regardless of the amount of calories adolescents consume and the physical activity done, an excessive proportion of fat in the diet leads to a greater accumulation of fat in the abdomen, according to a new study published in the journal *Clinical Nutrition*.

UPV/EHU researchers studied the role of dietary fat in the build-up of abdominal fat in 224 HELENA study adolescent participants. Researchers measured abdominal fat; dietary habits and physical activity were also measured. The goal was to determine whether diets with a high fat content could increase the risk of obesity even without increasing the total calorie intake.

Results concluded that the percentage of dietary fat is linked to an increase in abdominal fat, and is also independent of the levels of physical exercise adolescents do.

“Despite the fact that physical activity is usually a prevention factor, in this particular case it is not able to counteract it,” said lead researcher Idoia Labayen, Ph.D. “These results point to dietary fat content as a key risk factor in abdominal adiposity in adolescents, no matter how much physical exercise they do.”

The accumulation of abdominal fat is the most harmful to health as it increases the risk of cardiovascular problems, diabetes mellitus, arterial high blood pressure, high cholesterol, etc.

"Adolescents are a risk group as far as lifestyles are concerned because they are starting to take their own decisions about what they want and do not want to eat, and they are also going through a period in which many of them have stopped doing any sport, etc.," Labayen said.



Tree Nuts Lower Risk of Metabolic Syndrome, Obesity

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Eating just one serving of tree nuts a day may help lower the risk of metabolic syndrome and obesity, according to a new study published in the journal *PLoS ONE*. The findings come on the heels of a landmark study released in December that found eating 1.5 ounces of nuts a day lowered total mortality in both men and women, and had significant inverse associations for deaths due to cancer, heart disease and respiratory disease.

For this study, researchers at Loma Linda University looked at the association between tree nuts (almonds, Brazil nuts, cashews, hazelnuts, macadamias, pecans, pine nuts, pistachios and walnuts), metabolic syndrome and obesity in a population with a wide range of nut intake ranging from never to daily.

They studied 803 Seventh-day Adventist adults using a validated food-frequency questionnaire and assessed both tree nut and peanut intake together and separately. Mean tree nut intake was 16 grams/day among the high tree nut consumers and 5 grams/day among low tree nut consumers.

"Our results showed that one serving (28g or 1 ounce) of tree nuts per week was significantly associated with 7% less metabolic syndrome," said lead researcher Karen Jaceldo-Siegl, PhD. "Doubling this consumption could potentially reduce metabolic syndrome risk by 14%. Interestingly, while overall nut consumption was associated with lower prevalence of metabolic syndrome, tree nuts specifically appear to provide beneficial effects on metabolic syndrome, independent of demographic, lifestyle and other dietary factors."

Metabolic syndrome is a cluster of risk factors shown to be associated with death, a twofold increased risk for cardiovascular disease, and a fivefold increased risk for type 2 diabetes. While the diagnostic criteria can vary, presence of any three of the five following conditions results in a diagnosis of metabolic syndrome : abdominal obesity, elevated triglycerides, low HDL cholesterol, high blood pressure, and hyperglycemia.

In addition to the effect of nuts on metabolic syndrome, the researchers also looked at the effect on obesity.

"We found that high tree nut consumers had significantly lower prevalence of obesity compared to the low tree nut consumers," Jaceldo-Siegl said. "And, high consumers of tree nuts had the lowest prevalence of obesity when compared to the low peanut/tree nut groups."

Commenting on the results of the study, Maureen Ternus, M.S., R.D., Executive Director of the International Tree Nut Council Nutrition Research & Education Foundation (INC NREF), said: "All of this new research supports the growing body of evidence showing that consuming nuts can improve your health. In 2003, FDA (in its qualified health claim for nuts and heart disease) recommended that people eat 1.5 ounces of nuts per day—well above current consumption levels—so we need to encourage people to get their handful of nuts every day."



Academy of Nutrition, Dietetics Updates Stance on Fat Intake

January 10, 2014 Food Product Design

Healthy adults should consume between 20%-35% of their calories from dietary fat, increase their consumption of omega-3 fatty acids, and limit their intake of saturated and *trans* fats, according to an updated position paper from the Academy of Nutrition and Dietetics published in the *Journal of the Academy of Nutrition and Dietetics*.

To achieve the recommended fat intake, the academy suggests a food-based approach through a diet that includes regular consumption of fatty fish, nuts and seeds, lean meats and poultry, low-fat dairy products, vegetables, fruits, whole grains and legumes.

Other recommendations include:

- Fish is an excellent source of the omega-3s EPA and DHA; flax, walnuts and canola oil are good sources of ALA omega-3.
- A fat-free diet is not recommended, as fat is a critical nutrient. Certain types of fat, such as omega-3s and omega-6s, are needed for good health.
- Increase intake of fish, nuts and seeds and consume fewer desserts and convenience foods.
- Different foods provide different types of fat. Some fats improve your health (omega-3s help your heart and brain) while some are detrimental to your health (*trans fat increases heart disease risk factors*).



Demand for Healthy Kids' Foods, Beverages Fuels Innovation

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When it comes to children's nutrition, it's no longer enough for companies to just serve up food and beverages with the main goal being that it tastes good. New and reformulated favourites have to take a healthier formulation plan into consideration to meet the changing attitudes about what's suitable to feed kids to prevent obesity and nourish growing minds and bodies.

While kids are seeking foods that appeal to their taste buds, parents are increasingly looking for products they feel good about feeding their families. And it's not just the parents. Everyone from school districts to public health organizations are scrutinizing the kid's menu.

Having rebuilt school breakfasts and lunches in a healthier style, the U.S. Department of Agriculture (USDA) is turning to snacks, using its new Smart Snacks in Schools standards to improve the nutritional quality of the snacks and drinks kids purchase on campus.

USDA now requires snack items to clock in at 200 calories or fewer per serving, and deliver no more than 230 mg of sodium—a quantity that drops to 200 mg on July 1, 2016. Total fat may account for no more than 35% of calories, with saturated fat making up less than 10% of that; *trans* fats aren't permitted at all. Also, any food item must be 50% whole grain, or have whole grain as the first ingredient. As for total sugars, their ceiling is set at 35% of the snack's weight.

And so, manufacturers are stepping up to the challenge and creating more healthful snacks not only in the tightly regulated market of the school cafeteria, but in retail snack aisles as well. Formulation trends to improve healthfulness of snacks include substituting raisins for some sugar and sodium in various recipes, using fruit- and vegetable-based ingredients to eliminate undesirable colorants and using bean and bean flours in baked good and chips.

Further, formulators are increasing nutrition in beverages for children by incorporating vegetable juices and fortifying with vitamins, minerals and other nutrients. Keeping sugar content low is also key, especially considering the majority of health and nutrition authorities blame sugary drinks as the leading source of unnecessary calories among obese children.

To keep in line with kids' flavour preferences, formulators often keep flavours simple, creative and fun. Classics, like strawberry, chocolate and green apple, tend to resonate well with children, while they also crave those that pique their curiosity, like pomegranate, dragon fruit and prickly pear. Ethnic flavours and complex flavour combinations like blueberry lemonade and birthday cake are also taking stage.

For a closer look at flavours for kids, as well as insight on kids' nutritional needs and tips on formulating foods and beverages for children, visit **Food Product Design's** Digital Issues Healthy Snack for Kids and Kids' Foods and Beverages.



Salty Snackers Turn To Better-For-You Options

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In the United States, 50 million consumers who often snack between meals agree that "salted snacks are my favourite snack," and 90% of households report eating salty snacks in the past 30 days, according to new market research from Packaged Facts.

The report, "Salty Snacks in the U.S.," attributes the success of snack foods to the strides food manufacturers have made in developing healthier salty snack foods that still taste good. As a result, there is a cadre of 14 million "healthy" salty snackers who exercise often, seek out healthy-ingredient foods of all kinds, and do not see a conflict between craving salty snacks and pursuing a healthy snacking diet.

According to Packaged Facts research director David Sprinkle, part of salty snacks' metamorphosis into better-for-you products has been a change in product labelling that mirrors that for other

better-for-you positioned foods such as fruit- and nut-based snacks. Salty snacks now often call out attributes such as “non-GMO,” “vegan” or “organic.” They also often are labelled local, pure, real, natural, safe, clean, minimally processed and allergy-friendly.

Packaged Facts projects that a number of factors will converge to generate faster growth for the salty snacks market during the upcoming 2014-2018 period. Manufacturers will continue to add more healthy-ingredient products to the salty snack segment to meet demand, including offerings from niche entrepreneurial companies that focus on bringing innovative health-ingredient salty snacks to consumers.



Traffic-Light Labelling Promotes Eating Changes

January 8, 2014 Food Product Design

Food environment interventions, such as colour-coded labelling (traffic-light labelling) of food, may promote long-term changes in eating behaviours, according to the *American Journal of Preventive Medicine*.

Between Dec. 2009 and Feb. 2012 large hospital cafeteria with a mean of 6,511 daily transactions was analyzed for all cafeteria customers and a longitudinal cohort of 2,285 hospital employees who used the cafeteria regularly. Three months after the baseline period, items were rearranged for healthy accessibility and labelled green (healthy), yellow (less healthy) and red (unhealthy). Items such as fruits, vegetables and low-fat dairy were labelled green and foods with high caloric content and saturated fat were labelled red.

Sales of red-label items decreased from 24% at baseline to 20% at 24 months and green sales increased from 41% to 46%. Red beverages decreased from 26% at baseline to 17% and green beverages increased from 52% to 60%. Similar patterns were observed for the cohort of employees with the largest change for red beverages.



“These findings are the most important of our research thus far because they show a food labelling and product placement intervention can promote healthy choices that persist over the long term,

with no evidence of 'label fatigue,'" said Anne Thorndike lead author, division of general medicine, Massachusetts General Hospital. "The next steps will be to develop even more effective ways to promote healthy choices through the food service environment and translate these strategies to other work site, institutional, or retail settings."

The Australian government rejected the introduction of "traffic-light" food labelling system which would have required foods and beverages to carry red, amber or green ratings for key ingredients such as fats, salts and sugars.



Probiotics may prevent gastrointestinal disorders in infants

A study published in *JAMA Pediatrics* shows that giving an infant a probiotic during the first three months of life may reduce the onset of gastrointestinal disorders. Infant colic, acid reflux, and constipation are the most common gastrointestinal disorders that lead to a pediatrician referral during the first six months of life. They are often responsible for hospitalization, feeding changes, use of drugs, parental anxiety, and loss of parental working days, according to the study background.

The researchers randomized 554 newborns in nine pediatric units in Italy to the probiotic *Lactobacillus reuteri* DSM 17938 or placebo for 90 days, and asked parents to record in diary entries the number of vomiting episodes and evacuations (emptying of the bowels), the duration of inconsolable crying, and the number of pediatrician visits. Change in daily crying time, vomiting, constipation, and the cost benefits of probiotic supplement use were measured during the three-month period.

At three months of age, the average duration of crying time (38 vs. 71 min), regurgitations (2.9 vs. 4.6), and evacuations per day (4.2 vs. 3.6) differed in the probiotic and placebo groups, respectively. Probiotic use also was associated with a nearly \$119 average savings per patient in each family.

The researchers concluded that, "Driving a change of colonization during the first weeks of life through giving lactobacilli may promote an improvement in intestinal permeability; visceral sensitivity and mast cell density and probiotic administration may represent a new strategy for preventing these conditions, at least in predisposed children."

IFT Weekly January 15, 2014



Indian gooseberry may help lower cholesterol in type 2 diabetes patients

Endothelial dysfunction is one of the early prognostic markers of atherosclerosis, and may eventually result in cardiovascular disease. It has been reported that endothelial dysfunction occurs in patients with diabetes much earlier than the clinical manifestations of vascular complications of the disease. A study published in *Diabetes, Metabolic Syndrome and Obesity: Targets and Therapy* shows that the herbal plant amla may improve endothelial function and reduced biomarkers of oxidative stress. Amla (*Phyllanthus emblica*) is an herbal plant used widely in indigenous medicinal

preparations used to treat a variety of diseases. It is also known as the Indian gooseberry or amlaki, and is used in Indian medicine as a cardi tonic.

The study compared the effects of an aqueous extract of *P. emblica* versus those of atorvastatin (a statin drug used to lower cholesterol) and placebo on endothelial dysfunction and biomarkers of oxidative stress in patients with type 2 diabetes. Eighty patients were randomized to receive either *P. emblica* 250 mg twice daily, *P. emblica* 500 mg twice daily, atorvastatin 10 mg in the evening and matching placebo in the morning, or placebo twice daily for 12 weeks. The primary efficacy parameter was the change in endothelial function identified at baseline and after 12 weeks of treatment. Secondary efficacy parameters were changes in biomarkers of oxidative stress (malondialdehyde, nitric oxide, and glutathione), high sensitivity C-reactive protein levels, the lipid profile, and glycosylated hemoglobin (HbA1c) levels.

The researchers found that treatment with *P. emblica* 250 mg, *P. emblica* 500 mg, or atorvastatin 10 mg produced significant reductions in endothelial function after 12 weeks of treatment compared with baseline. Compared with placebo, the mean reduction in total cholesterol was 10.89%, 14.3%, and 24.68% on *P. emblica* 250 mg, *P. emblica* 500 mg, and atorvastatin, respectively, and low-density lipoprotein cholesterol decreased by 15.88%, 20.15%, and 35%, respectively. There was a significant improvement in biomarkers of oxidative stress and systemic inflammation compared with baseline and placebo. Further, the treatments significantly improved the lipid profile and HbA1c levels compared with baseline and placebo. All treatments were well tolerated.

The researchers concluded that both atorvastatin and *P. emblica* significantly improved endothelial function and reduced biomarkers of oxidative stress and systemic inflammation in patients with type 2 diabetes mellitus, without any significant changes in laboratory safety parameters.

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Caffeine may enhance long-term memory

A study published in *Nature Neuroscience* shows that the consumption of caffeine enhances certain memories at least up to 24 hrs after it is consumed. Michael Yassa, Assistant Professor of Psychological and Brain Sciences in the Krieger School of Arts and Sciences at Johns Hopkins, and his team of scientists found that caffeine has a positive effect on long-term memory in humans.

“We’ve always known that caffeine has cognitive-enhancing effects, but its particular effects on strengthening memories and making them resistant to forgetting has never been examined in detail in humans,” said Yassa, senior author of the paper. “We report for the first time a specific effect of caffeine on reducing forgetting over 24 hrs.”

The Johns Hopkins researchers conducted a double-blind trial in which participants who did not regularly eat or drink caffeinated products received either a placebo or a 200-mg caffeine tablet five minutes after studying a series of images. Salivary samples were taken from the participants before they took the tablets to measure their caffeine levels. Samples were taken again one, three and 24 hrs afterwards.

The next day, both groups were tested on their ability to recognize images from the previous day's study session. On the test, some of the visuals were the same as from the day before, some were new additions, and some were similar but not the same as the items previously viewed. More members of the caffeine group were able to correctly identify the new images as "similar" to previously viewed images versus erroneously citing them as the same. The brain's ability to recognize the difference between two similar but not identical items, called pattern separation, reflects a deeper level of memory retention, the researchers said.

The research is different from prior experiments because the subjects took the caffeine tablets only after they had viewed and attempted to memorize the images. "Almost all prior studies administered caffeine before the study session, so if there is an enhancement, it's not clear if it's due to caffeine's effects on attention, vigilance, focus, or other factors. By administering caffeine after the experiment, we rule out all of these effects and make sure that if there is an enhancement, it's due to memory and nothing else," said Yassa.

IFT Weekly January 15, 2014



Increasing Vitamin D Slows Progression of Multiple Sclerosis

January 21, 2014 Food Product Design

Individuals in the early stages of multiple sclerosis (MS) who increase their dietary intake of vitamin D may be able to reduce the severity of symptoms and may even slow the progression of the disease, according to a new study published online in *JAMA Neurology*.

Researchers at Harvard School of Public Health (HSPH), in collaboration with Bayer HealthCare, said low levels of vitamin D were found to strongly predict disease severity and hasten its progression in patients in the early stages of MS.

"Because low vitamin D levels are common and can be easily and safely increased by oral supplementation, these findings may contribute to better outcomes for many MS patients," said lead author Alberto Ascherio, professor of epidemiology and nutrition at HSPH.

Previous research indicated a connection between low levels of vitamin D and risk of developing MS or having MS symptoms worsen; however, those studies included patients with longstanding MS whose vitamin D levels could partly be a consequence, not a predictor, of disease severity. The new study looked at vitamin D levels among patients at the time of their first symptoms of the disease. Researchers analyzed data from 465 MS patients from 18 European countries, Israel, and Canada who enrolled in 2002 and 2003 in the BENEFIT (Betaseron in Newly Emerging Multiple Sclerosis for Initial Treatment) trial, which was aimed at comparing the effectiveness of early versus late interferon beta-1b in treating the disease. The scientists looked at how the patients' vitamin D levels—which were measured at the onset of their symptoms and at regular intervals over a 24-month period—correlated with their disease symptoms and progression over a 5-year period.

They found that early-stage MS patients who had adequate levels of vitamin D had a 57% lower rate of new brain lesions, a 57% lower relapse rate, and a 25% lower yearly increase in lesion volume

than those with lower levels of vitamin D. Loss in brain volume, which is an important predictor of disability, was also lower among patients with adequate vitamin D levels.

The results suggest that vitamin D has a strong protective effect on the disease process underlying MS, and underscore the importance of correcting vitamin D insufficiency that is widespread in Europe and the United States.



Flavonoid-Rich Foods Protect Against Diabetes

January 21, 2014 Food Product Design

Chocolate and wine lovers have another reason to celebrate. A new study published in the *Journal of Nutrition* found eating high levels of flavonoids, including anthocyanins, and other compounds found naturally in berries, red wine and chocolate may help ward off the onset of type 2 diabetes.

The findings suggest high intakes of the dietary compounds are associated with lower insulin resistance and better blood glucose regulation. The researchers also found that those specific food groups lower inflammation associated with diabetes, obesity, cardiovascular disease and cancer.

Researchers at the University of East Anglia (UEA) and King's College London investigated the benefits of eating certain sub-groups of flavanoids. They focused on flavones, which are found in herbs and vegetables, such as parsley, thyme, and celery, and anthocyanins, found in berries, red grapes, wine and other red or blue-coloured fruits and vegetables.

For the study, researchers studied almost 2,000 healthy women volunteers from Twins, UK, who had completed a food questionnaire designed to estimate total dietary flavonoid intake as well as intakes from six flavonoid subclasses. Blood samples were analyzed for evidence of both glucose regulation and inflammation. Insulin resistance was assessed using an equation that considered both fasting insulin and glucose levels.

"We found that those who consumed plenty of anthocyanins and flavones had lower insulin resistance. High insulin resistance is associated with type 2 diabetes, so what we are seeing is that people who eat foods rich in these two compounds, such as berries, herbs, red grapes and wine, are less likely to develop the disease," said lead researcher Aedin Cassidy from UEA's Norwich Medical School.

"We also found that those who ate the most anthocyanins were least likely to suffer chronic inflammation, which is associated with many of today's most pressing health concerns, including diabetes, obesity, cardiovascular disease, and cancer."

The researchers also found those who consumed the most flavone compounds had improved levels of the protein adiponectin that helps regulate a number of metabolic processes including glucose levels.



Study Bolsters Fibre's Role in Colon Health

January 21, 2014 Food Product Design

A receptor doctors already activate with niacin to protect patients' cardiovascular systems also plays a key role in preventing colon inflammation and cancer, according to a new study published in the journal *Immunity*.

The finding helps explain why a high-fibre diet reduces the risk of colon problems and indicates that when fibre is lacking, niacin, or vitamin B₃ just may help keep the colon healthy as well, said Vadivel Ganapathy, Ph.D., chairman of the department of biochemistry and molecular biology at the Medical College of Georgia at Georgia Regents University, and corresponding study author.

The study found that mice lacking the receptor, Gpr109a, were prone to inflammation and cancer of the colon, said Nagendra Singh, Ph.D., MCG immunologist, member of the cancer immunology, inflammation and tolerance program at the GRU Cancer Centre, and corresponding study author.

And, when they gave niacin to mice whose healthy colonic bacteria had been wiped out by antibiotics—a frequent occurrence in chronic antibiotic use—it helped steer immune cells in the colon into a safe, anti-inflammatory mode.

Good bacteria in the colon thrive on fibre and its digestion produces butyrate, a short-chain fatty acid, which naturally activates Gpr109a.

Research teams at GlaxoSmithKline and the University of Heidelberg, Germany showed in 2003 that Gpr109a receptors on the surface of fat cells mediate the protective cardiovascular effect of niacin, including increasing good cholesterol, or HDL, while decreasing levels of disease-producing LDL. Their search for other activators identified butyrate, which led Ganapathy to find that not only is the Gpr109a receptor expressed on the surface of colon cells, but that with sufficient fibre intake, butyrate levels in the colon can activate it.

Now, he and Singh have shown activation of Gpr109a in the colon by butyrate prompts immune cells, which are in ample supply in that region, to suppress rather than promote inflammation, a factor in a number of painful conditions such as ulcerative colitis, Crohn's disease and colorectal cancer.

Once butyrate activates the Gpr109a receptor on dendritic cells and macrophages in the colon, these immune cells start producing anti-inflammatory molecules and sending messages to the T cells, key orchestrators of immunity, to do the same, Singh said. Butyrate also prompts epithelial cells that line the colon to produce cytokines, which aid wound-healing, a critical step for resolving the intestinal inflammation that occurs in ulcerative colitis and Crohn's.

"To protect your colon, you need this receptor, as well as the fibre and butyrate which activate it," Ganapathy said. For people who won't or can't eat high-fibre diets, mega-doses of niacin, may help protect the colon, the way it's already protecting hearts, the scientists suggest.

In a 2013 study, consuming dietary fibre found in whole grains, fruits and vegetables, decreased the risk of cardiovascular disease and associated risk factors in participants.



Fast food not the major cause of rising childhood obesity rates, study finds

January 15, 2014 Science Daily

Children's consumption of fast food is only a small part of a much more pervasive dietary pattern that is fostered at an early age by children's parents and caregivers. The pattern includes few fruits and vegetables, relying instead on high amounts of processed food and sugar-sweetened beverages.

For several years, many have been quick to attribute rising fast-food consumption as the major factor causing rapid increases in childhood obesity. However a new study found that fast-food consumption is simply a byproduct of a much bigger problem: poor all-day-long dietary habits that originate in children's homes.

The study, titled "The association of fast food consumption with poor dietary outcomes and obesity among children: is it the fast food or the remainder of diet?," was produced by researchers at The University of North Carolina at Chapel Hill's Gillings School of Global Public Health and published in the latest issue of *The American Journal of Clinical Nutrition*.

The study's researchers found that children's consumption of fast food is only a small part of a much more pervasive dietary pattern that is fostered at an early age by children's parents and caregivers. The pattern includes few fruits and vegetables, relying instead on high amounts of processed food and sugar-sweetened beverages. These food choices also are reinforced in the meals students are offered at school.

"This is really what is driving children's obesity," said Barry Popkin, PhD, W.R. Kenan Jr. Distinguished Professor of nutrition at UNC's Gillings School of Global Public Health, whose team led the study. "Eating fast foods is just one behaviour that results from those bad habits. Just because children who eat more fast food are the most likely to become obese does not prove that calories from fast foods bear the brunt of the blame."

The study examined data acquired through the National Health and Nutrition Examination Survey (NHANES) between 2007 and 2010. Dietary intake, including whether foods and beverages were obtained in fast-food establishments or elsewhere, was evaluated in 4,466 children who were 2 years to 18 years of age. They were further categorized as being non-consumers of fast food (50 percent of the children), low consumers (less than or equal to 30 percent of calories from fast foods; 40 percent of the children), or high consumers (more than 30 percent of calories from fast foods; 10 percent of the children). The researchers then determined which factors were most related to dietary adequacy and risk for obesity.

"The study presented strong evidence that the children's diet beyond fast-food consumption is more strongly linked to poor nutrition and obesity," said Jennifer Poti, doctoral candidate in UNC's Department of Nutrition and co-author of the study. "While reducing fast-food intake is important, the rest of a child's diet should not be overlooked."

Popkin said he is certainly no fan of fast-food consumption, but actually knowing where the problem originates is important if we are to invest in solutions that foster healthier habits, including reducing the consumption of sugary drinks and emphasizing more fresh vegetables and fruit.

"Children who rely on fast foods may tend to have parents who do not have the means, desire or time to purchase or prepare healthy foods at home," Popkin said. "This is really what is driving children's obesity and what needs to be addressed in any solution."



Amount, types of fat we eat affect health, risk of disease

January 8, 2014 Science Daily

Healthy adults should consume between 20 percent and 35 percent of their calories from dietary fat, increase their consumption of omega-3 fatty acids, and limit their intake of saturated and trans fats, according to an updated position paper from the Academy of Nutrition and Dietetics.

The position paper "Dietary Fatty Acids for Healthy Adults" has been published in the January issue of the *Journal of the Academy of Nutrition and Dietetics*. The position paper provides guidance for registered dietician nutritionists and dietetic technicians, registered to translate research on fat and fatty acids into practical dietary recommendations for consumers.

The Academy's updated position is: It is the position of the Academy of Nutrition and Dietetics that dietary fat for the healthy adult population should provide 20 percent to 35 percent of energy, with an increased consumption of n-3 polyunsaturated fatty acids and limited intake of saturated and trans fats. The Academy recommends a food-based approach through a diet that includes regular consumption of fatty fish, nuts and seeds, lean meats and poultry, low-fat dairy products, vegetables, fruits, whole grains and legumes.

Registered dietician nutritionists can help consumers understand that a total diet approach is more beneficial than simply reducing dietary fat and replacing it with carbohydrates, as a high intake of refined carbohydrate can also negatively affect health.

The Academy's position paper can be translated into healthful eating messages for the public:

- A simple and effective way to improve health is to eat more fish, nuts and seeds and to consume fewer desserts and convenience foods.
- Fat is a critical nutrient, and certain types of fat, such as omega-3s and omega-6s, are needed for good health. For this and other health reasons, a fat-free diet is not recommended.
- Fish is an excellent source of the omega-3s EPA and DHA; flax, walnuts and canola oil are good sources of ALA omega-3.
- Both the amount of fat (how much) and the type of fat (what foods) in the diet can affect health and risk of disease.
- Different foods provide different types of fat. Some fats improve your health (omega-3s help your heart and brain) while some are detrimental to your health (trans fat increases heart disease risk factors). ***

Food Science & Industry News

Study Finds Social Norms Influence Food Choices

December 31, 2013 Food Product Design

Consumers are more likely to make food and beverage choices—like consuming high- or low-calorie options and large portions—when other people are making the same choices, according to a new study published in the *Journal of the Academy of Nutrition and Dietetics*.

University of Liverpool researchers conducted a systematic review of several experimental studies, each of which examined whether or not providing information about other peoples' eating habits influences food intake or choices.

The review looked at a total of fifteen studies—eight examined how information about food intake norms influenced food consumed by participants; seven other studies reported the effects of food choice norms on how people decide what food to eat.

The meta-analysis found that if participants were given information indicating that others were making low-calorie or high-calorie food choices, it significantly increased the likelihood that participants made similar choices. Also, data indicate that social norms influence the quantity of food eaten. Additionally, suggesting that others eat large portions increased food intake by the participants.

"It appears that in some contexts, conforming to informational eating norms may be a way of reinforcing identity to a social group, which is in line with social identity theory," said lead investigator Eric Robinson, Ph.D. "By this social identity account, if a person's sense of self is strongly guided by their identity as a member of their local community and that community is perceived to eat healthily, then that person would be hypothesized to eat healthily in order to maintain a consistent sense of social identity."

The analysis also revealed that the social mechanisms that influence what we decide to consume are present even when we eat alone or are at work, whether or not we are aware of it.

"The evidence reviewed here is consistent with the idea that eating behaviours can be transmitted socially," said Robinson. "Policies or messages that normalize healthy eating habits or reduce the prevalence of beliefs that lots of people eat unhealthily may have beneficial effects on public health."



30% of Global Cereal Crop Yields To Decline, Researchers Say

December 31, 2013 Food Product Design

About 30% of the major global cereal crops—rice, wheat and corn—may have reached their maximum possible yields in farmers' fields, according to new research published in the journal *Nature Communications*.

Yields of these crops have recently decreased or plateaued. Future projections that would ensure global food security are typically based on a constant increase in yield, a trend that research now suggests may not be possible. As a result, projections of future yields have been optimistic—perhaps too much so.

University of Nebraska-Lincoln researchers studied past yield trends in countries with greatest cereal production to provide evidence against a projected scenario of continued linear crop yield increase. Estimates of future global food production have been based largely on projections of historical trends. Past trends, however, have been dominated by the rapid adoption of new technologies—some of which were one-time innovations—which allowed for an increase in crop production.

The research suggests that the rate of yield gain has recently decreased or stopped for one or more of the major cereals in many of the most intensively cropped areas of the world, including eastern Asia, Europe and the United States.

In China, for example, the increase in crop yields in wheat has remained constant, and rate of corn yield increase has decreased by 64% for the period 2010-2011 relative to the years 2002-2003 despite a large increase in investment in agricultural research and development, education and infrastructure for both crops. This suggests that return on these investments is steadily declining in terms of impact on raising crop yields.

The need to feed the growing population has long been a concern, and researchers are taking steps to resolve the issue. In fact, prior research found increasing crop frequency could boost food supply.



Bacteria to Aid Sustainable Sugarcane Production

December 27, 2013 Food Product Design

A new bacterium found in the roots of sugarcane could reduce the use of fertilizer in sugarcane production and improve yield, according to a new study published in the journal *Microbial Biotechnology*.

University of Queensland researchers searched for bacteria that were present in large numbers around the roots of thriving sugarcane plants.

Researchers discovered a new bacterium, *Burkholderia australis* that promotes plant growth through a process called nitrogen fixation. The bacteria was tested to ensure that they were happy living amongst the roots of growing sugarcane seedlings, and sequencing the genome to confirm that they had the genetic ability to turn nitrogen into plant food.

"While two of the most abundant bacteria did not have noticeable effects on plant growth, *Burkholderia australis* was doing quite well in competition with other soil bacteria in the environment, and turned out to be particularly good for the plants," said lead researcher Chanyarat Paungfoo-Lonhienne, Ph.D.

Bacteria are widely used in sugar cane production, as well as with other crops, where they help to break down organic matter in the soil to make vital nutrients available to the growing plants or turn nitrogen from the air into nitrogen compounds that are essential for growth (so-called biological nitrogen fixation).

The results can be very variable, which is unsurprising given the complexity of biological processes in and around the plant root. This variability means that the success of bacterial fertilizers might depend on developing tailor-made versions for different crop cultivars and environments.

In addition, bacteria can be used to battle foodborne pathogens. The coat of potential poultry probiotic *Lactobacillus johnsonii* was recently characterized, giving the first clues of how it may be used to exclude pathogenic bacteria from chickens.



Plant-based sweeteners continue to steal market share

Post EU regulations, stevia has been quietly gaining traction with consumers, and alongside that, usurping the traditional pecking order of more established sweeteners. A new report from Mintel and Leatherhead Food Research highlights the opportunity for such plant-based sweeteners.

Indeed, while the value of stevia as an additive for use in food and beverage manufacture totaled \$110 million in 2013, Mintel and Leatherhead Food Research forecasts growth of \$275 million by 2017. In contrast, aspartame, while recently having been confirmed safe for human consumption at current levels from the EFSA and currently accounting for a value of £280 million in 2013, is forecast to drop to £210 million by 2017 as stevia, and blends of stevia and other sweeteners such as acesulfame K, begin to take a greater share of the market.

In 2009, only 5% of food and drink products launched using intense sweeteners used solely plant-derived sweeteners (although a further 2% used a blend of artificial and plant-derived sweeteners). In contrast in 2013, the share of plant-derived sweeteners jumped to 15% (with a further 3% used a blend of artificial and plant-derived sweeteners). Between 2011 and 2013, plant-derived sweeteners reached a high of 28% of launches in North America.

By the end of 2013, the global market for intense sweeteners as additives used in the manufacture of food and beverage products is forecast to reach a value of \$1.27 billion, a figure which represents an increase of 2.8% compared with 2012. By 2017, global market value is expected to increase to almost \$1.4 billion, up by 9.7% from levels in 2013.

However, breaking down the usage of intense sweeteners in new product launches shows that today's artificial variants, such as acesulfame K, sucralose, and aspartame are still dominant. Due to its use in blends, acesulfame K leads in launch activity; however, the share of products using acesulfame K has gradually declined from 56% in 2009 to 49% of launches in 2013. Sucralose takes the second spot and its use has remained constant over the past five years, found in around 40% of all products launched with an intense sweetener. Aspartame comes in next; however, its share is consistently dropping year on year, going from being used in 40% of 2009 launches to 32% of 2013 launches. Categories still heavily reliant on artificial variants include sugar confectionery, desserts and ice cream, dairy products, and carbonated soft drinks.

"Plant-derived sweeteners, such as stevia, are expected to provide the main impetus for growth in the sweetener market in the coming years. As manufacturers work to create the right taste profile for stevia and for other plant-derived sweeteners, such as monk fruit, to obtain regulatory clearance, the artificial sweetener market still offers growth opportunities, in particular the sucralose and acesulfame-K markets," said Emma Gubisch, Strategic Insight Manager at Leatherhead Food Research.

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On-The-Go Breakfast on The Rise

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On-the-go breakfasts are once again on the rise, and consumers are looking for easily portable, yet nutritious items, according to the NPD Group.

In 2008, when the recession hit forcing unemployment to increase, grab-and-go breakfast items like snack bars and yogurt began to decrease, but now with an increase in employment, carried-from-home breakfasts are on the rise once again.

Carrying breakfast from home is predominantly an adult behaviour, especially among adults who are employed full-time. The peak start time for consuming a carried breakfast is 8:00 a.m., and these occasions are nearly three times more likely to occur on a weekday when adults are commuting to work, finds NPD. Cold cereal, fruit juice, toast, and hot cereal are among the items consumed at in-home breakfasts whereas carried-from-home breakfasts include grab-and-go items like fruit, coffee, snack bars, and yogurt.

"With over 3 billion occasions in the U.S. annually, carrying breakfast from home is a sizeable behaviour representing a significant opportunity for manufacturers and retailers," said Darren Seifer, food and beverage industry analyst. "Adults are looking for nutritious, easily portable breakfast foods and beverages that they can have on hand. Marketers need to take a closer look at these consumers and make sure their needs are being met with current offerings."



Enzyme-treated whey gains online UK debut

Nutra-Ingredients 03-Jan-2014

A sports nutrition firm has become the first online-focused business in the UK to offer an enzyme-treated form of whey protein.



The company, The Protein Works, told us the cost of New Jersey-based, Innophos-owned Triarco's enzymatic 'Aminogen' technology was being

absorbed by the company based in the north west of England. Aminogen is described as a patented blend of digestive proteases from *Aspergillus niger* and *Aspergillus oryzae* that studies have shown speeds the bodily absorption of protein forms.

Aminogen is certified Kosher, Halal, and is self-affirmed GRAS (Generally Recognised as Safe) in the US. One study involving Aminogen found it increased whey protein concentrate (WPC) absorption over regular WPC. The Protein Works co-founder Nick Smith said his firm was the first to use Aminogen, *"without the premium price tag."*

"Whilst this obviously comes at an additional cost to us as a business and is also more complex in terms of manufacturing, we wanted to really differentiate our whey protein from the competition in 2014..." Smith said. *"It will be interesting to see how the industry responds now we've made our standard whey protein, less standard."*

Aminogen efficacy was reported in a paper published in the *Journal of the International Society of Sports Nutrition* which concluded that the patented blend of digestive proteases could triple the rate of protein absorption, increase free amino acid levels by 100%, key amino acid levels by 250%, and nitrogen retention by 32%.

Beyond sports nutrition, opportunities are developing to counter the increase in issues like muscle wasting. The ingredient is being used in medical foods for use in institutions and hospitals.



Food Safety & Regulatory News

USDA OKs Processing Aid to Combat Salmonella

January 8, 2014 Food Product Design

The U.S. Department of Agriculture (USDA) and U.S. Food and Drug Administration (FDA) have approved Microeos' SALMONELEX™ as GRAS (generally recognized as safe) for use as an antimicrobial food-processing aid against *Salmonella*.

SALMONELEX, which consists of natural phages against *Salmonella* that eliminate the bacteria rather than inhibit its growth, can be sprayed topically or added to chill tank water. According to the company, the solution targets only *Salmonella* and has no other effect on the treated food product, neither in taste, nor texture.

Microeos anticipates that it will soon be listed by the Organic Material Review Institute (OMRI) for use in organic foods, just like its phage product against *Listeria*, LISTEX. The company said industrial-scale projects with U.S. poultry processors will begin in January 2014.

"Research has shown that SALMONELEX does not dissipate in the presence of protein. Thus, the product enables processors to reduce the use of chemicals and reach *Salmonella* in places where antimicrobial chemicals are ineffective, for example in follicles that close when exposed to cold water in a chiller," said Dirk de Meester, business development manager for Microeos.



FDA releases guidance to clarify liquid dietary supplements vs. beverages

The U.S. Food and Drug Administration (FDA) has released a guidance entitled "Guidance for Industry: Distinguishing Liquid Dietary Supplements from Beverages." The guidance is intended to help dietary supplement and beverage manufacturers and distributors determine whether a product in liquid form is properly classified as a dietary supplement or as a beverage.

In the Dec. 4, 2009, *Federal Register* the FDA made available a draft guidance entitled "Draft Guidance for Industry: Factors That Distinguish Liquid Dietary Supplements From Beverages, Considerations Regarding Novel Ingredients, and Labeling for Beverages and Other Conventional Foods" and gave interested parties an opportunity to submit comments by Feb. 2, 2010, for the agency to consider before beginning work on the final version of the guidance.

The FDA has observed an increase in the marketing of liquid products with a wide array of ingredients and intended uses. Some of these products are marketed as dietary supplements and others as conventional foods. In some instances, products may be misbranded because their labeling or other representations made about them are inconsistent with the product category under which they are being marketed. In addition, products may be excluded from the dietary supplement category because of representations that they are for use as conventional foods.

The guidance is intended to describe the factors that dietary supplement and beverage manufacturers and distributors should consider when deciding whether to market a liquid product

as a dietary supplement or a conventional food. Further, this guidance reminds manufacturers and distributors of dietary supplements and beverages about the requirements of the Federal Food, Drug, and Cosmetic Act regarding ingredients and labeling.

This guidance finalizes the draft guidance dated December 2009.

IFT Weekly January 15, 2014



New Test Detects GMOs in Food

January 15, 2014 Food Product Design

As GMO foods become more prevalent, consumers have also become more wary of changes made to these items. Genes of genetically engineered (GE) plants are continually tweaked to make them more healthful or pest-resistant, and shoppers want information on what types of modifications occur within these bioengineered foods. Now, scientists in China have created the first comprehensive method for detecting genetic modifications to food in order to meet growing demands for the monitoring and labeling of genetically modified (GMO) food items, according to a new study published in the journal *Analytical Chemistry*.

The new method is called the MACRO test. MACRO stands for multiplex amplification on a chip with readout on an oligo microarray—it combines two well-known genetic methods to flag about 97% of the known commercialized modifications, almost twice as many as other tests. It also can be easily expanded to include future genetically modified crops.

The researchers said that by the end of 2012, farmers were growing GE crops on more than 420 million acres of land across 28 countries, which is 100 times more than when commercialization began in 1996. However, doubts persist about the potential effects these crops could have on the environment and human health. In response, policymakers, particularly in Europe, have instituted regulations to monitor GMO products. Although researchers have come up with many ways to detect genetic modification in crops, no single test has previously existed to perform a comprehensive scan.

In a recent debate over GMO food labeling, the U.S. Food and Drug Administration (FDA) declined requests by federal judges to determine whether food can be labeled "natural" if it contains GMO ingredients. Labels containing terms such as "organic" have become more prevalent as consumers increase their interest in food origins and GMO food products.



Researchers Develop First Method to Authenticate Cocoa

January 15, 2014 Food Product Design

For the first time, chocolate quality can be assessed using a new method to authenticate varietal purity and origin of cacao beans, according to a new study published in the *Journal of Agricultural and Food Chemistry*. Cacao beans are the source of chocolate's main ingredient, cocoa.

Researchers with USDA's Agricultural Research Service (ARS) applied recent developments in cacao genomics to identify a small set of DNA markers called SNPs (pronounced "snips") that make

up unique fingerprints of different cacao species, which can be used to authenticate cacao and ensure product quality.

The technique works on single cacao beans and can be scaled up to handle large samples quickly. "To our knowledge, this is the first authentication study in cacao using molecular markers," the researchers said.

It's not uncommon for lower-quality cacao beans to become mixed with premium varieties during processing into chocolate bars, truffles, sauces and liqueurs. But researchers argue the stakes for policing the chocolate industry are high—the chocolate industry is a multi-billion dollar global enterprise. In fact, the functional chocolate market alone is expected to reach \$353 million by 2015.

Further, the ability to authenticate premium and rare varieties would encourage growers to maintain cacao biodiversity rather than depend on the most abundant and easiest-to-grow trees.

