LONG ISLAND INSTITUTE OF FOOD TECHNOLOGISTS

GAZETTE

Monday June 10, 2019

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The Safety of Flavor Ingredients

Presented by Joe Piazza, Comax Flavors

The flavors found in foods, such as strawberries, are complex mixtures of natural molecules that change over time. A ripe strawberry has a different flavor than an unripe strawberry. The difference is in its chemical components. The actual amount of flavor in a food is usually measured in parts per million and even parts per billion. Processed foods such as soups, dressings, beverages, cereals, candies, etc., contain flavors that are formulated using essential oils, spice extracts, botanical extracts and aroma chemicals.. A peppermint candy usually contains peppermint oil distilled from peppermint leaves. Lemon-lime soda contains lemon oil and lime oil.

Flavors are added to food in kitchens in the form of spices and extracts. In the United States, the legal authority to add flavors to foods can be traced to the Food Additives Amendment of 1958 that was passed in order to modernize the Food Drug and Cosmetic Act of 1938. Based on the 1958 Amendment, in order for a flavor ingredient to be added to foods, it must be generally recognized as safe (GRAS) under the conditions of intended use. There are literally thousands of flavor ingredients which, when formulated creatively, become the flavors found in the foods most of us enjoyed **—con't on pg. 7**

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From The Chair:

Thanks for the attending another great meeting in April!

On June 10th, our last meeting of the year, we will have Joe Piazza of Comax Flavors speak on the "Safety of Flavor Ingredients." Some key points that he will be discussing include the history of flavor safety, evaluation and the contribution of a flavor chemist in the food industry. Please join us for an informative and important meeting.

Our section has been recognized as a 2018-2019 Section of Excellence (see below and to the left). This could have not happened without your wonderful attendance, at the meetings this year. Thanks so much!

Joe Minellla,
Chiair

Long Island IFT has been recognized as a 2018-2019 Section of Excellence! Here is an excerpt from the letter from National IFT:

"This recognition symbolizes the section's commitment of IFT, section members, and the food science and technology profession. You are vibrant communities of dedicated professionals the embody the spirit of IFT. The events held throughout the year, exemplary volunteer service, excellence in leadership and dedication the food science and technology profession demonstrate on going devotion to ensuring that the sections will flourish for years to come.

Congratulations on this achievement! Your section will be recognized in the *Section Leader Update* newsletter and in the Hall of Honor at IFT19."

MEETING PLACE & DIRECTIONS

Date: Monday, June 10, 2019

Place: The Inn at New Hyde Park
214 Jericho Tpk.
New Hyde Park, N.Y. 11040

Directions: go to www.innatnhp.com

Times: 6:00PM-6:45PM, cash bar, networking
6:45PM– 7:30 PM, dinner
7:30PM– speaker

Price: $40.00 per person with reservation
$50.00 per person at the door

Reservations: Carol Zamojcin @ 516-352-5772, anytime before Fri., June 7th

How Safe is 'Clean' Food?

While consumers may be demanding it, food scientists warn of increased risks for foodborne pathogens.

by Carolyn Schierhorn, Contributing Editor
Food Processing , February 2019

At its best, the "clean label" movement has fostered health-and-sustainability–conscious consumption, corporate transparency and considerable product innovation, many food industry experts agree. More and more consumers today, as a result, eat a wider variety of fresh fruits and vegetables and high-protein foods, read Nutrition Facts panels and ingredient decks, and try to reduce their sugar and salt intake—a boon to public health in a country with a high prevalence of adult obesity and dietary-related chronic diseases such as Type –2 diabetes and cardiovascular disease.

But misconceptions underpin the movement as well, most notably the fear of chemical–sounding ingredients and additives that are unfamiliar to lay consumers but well understood by food scientists. As the food processing industry rushes to reformulate products to appease consumers, a number of university-based scientists are raising concerns that removing or replacing time-tested preservatives could compromise food safety.

In addition, some nutritionists worry that misguided anxiety over an every-growing list of demonized chemicals distracts consumers from the importance of a balanced, nutrient-rich diet. In fact, food manufacturers have even removed vitamins and minerals from their products to "clean up" labels.

"I do see both pros and cons to the clean label movement. Ultimately, of course, what we want is a safe and nutritious food supply," says Debbie Petitpain, spokeswoman for the Academy of Nutrition and Dietetics in Chicago. "The flip side is that there is a movement that is clearly not going away in which consumers are interested in understanding what's in the food that they're eating. And that's not a bad thing."

Free from frenzy

In his 2008 book, "in Defense of Food: An Eater's Manifesto," activist Michael Pollan helped catalyze the frenzy for free-from foods with his warning not to eat anything containing unpronounceable substances that one's grandmother wouldn't recognize. During the past decade, bloggers such as "Food Babe" Vani Hari have further fanned consumer fears by condemning multisyllabic food additives in processed food.

"There's a lot of evidence that consumers find chemical-sounding words somewhat objectionable, " notes Jayson Lusk, who heads the department of agricultural economics at Purdue University, West Lafayette, Ind. The challenge, he says, is that industry efforts to be more transparent and comply with FDA ingredients labeling requirements have resulted in lists of scientific names for substances in food.

"You'll have an ingredient in a list like 'cobalamin' and consumers will think it's really scary, but it's just vitamin B12," observes Lusk, the author of "The Food Police: A Well-Fed Manifesto About the Politics of Your Plate." "Consumers think, 'Don't eat anything your grandmother couldn't pronounce.' But the reality is that sometimes we're using much more precise words than your grandmother would've used to explain exactly what's in the food."

Outspoken food industry critic Marion Nestle counters that such views exaggerate the public's ignorance of science. "Most people know the difference between vitamins and unnecessary and potentially harmful chemicals added to food," contends the retired former professor of nutrition, food studies and public health at New York University. "Most non-nutrient food chemicals are added to highly processed foods for the purpose of cosmetic (colors), covering up the loss in flavor that occurs with processing, or shelf-life. Most people would be better off eating less of highly processed foods."

Noting that healthful diets can include processed as well and fresh food. Petitpain argues the food manufacturers need to do more to educate consumers about why particular ingredients and additives are used in specific food products.

Can't do without effective antimicrobials

To remain competitive, many food processors, meanwhile have been busy simplifying ingredient decks and trying to eliminate or reduce synthetic food constituents, often replacing them with naturally derived counterparts.

Michael Doyle, retired professor of food microbiology and former director of the University of Georgia Center for Food Safety, acknowledges that not all the additives traditionally used by the food industry are absolutely necessary, but they do serve a purpose. "Some are for functionality. Some are for stability. Some are for color." he points out.

Doyle has many concerns about the removal and replacement of tried-and-true, proven-safe antimicrobial preservatives such as potassium sorbate and sodium benzoate.

"Sorbate and benzoate have been used for years as antimicrobial preservatives, not just for preventing mold and yeast growth," he explains. "Sorbate is added, for example, to certain foods like processed cheese that's vacuum-packaged because it helps prevent clostridium botulinum from growing and producing toxins."

Sorbate and benzoate are also highly effective against listeria , salmonella and other harmful microbes, adds Doyle, co-author of "The Challenges of Eliminating or Substituting Antimicrobial Preservative in Foods," an article published in *Annual Review of Food Science and Technology.*

In Fact, Doyle emphasizes, "There have been several examples throughout the years where foods have become toxic or pathogens have grown because the antimicrobials have been removed [from product formulations]."

Some of the substitutes for standard antimicrobials are less potent and reliable, according to Doyle. He notes that vinegar, which contains acetic acid, is commonly used today as an alternative preservative. "The acetic acid is what controls the pathogens, but it's not nearly as effective as sorbate or benzoate in terms of broad activity against spoilage organisms and salmonella and listeria"

Clean-label ingredient producers such as Amsterdam– based Corbion and Kemin Industries in Des Moines, Iowa, insist that their vinegar-based antimicrobials are highly effective, however.

Newly Weds Foods (www.newlywedsfoods.com) has a portfolio of natural food safety ingredients, most of them based on rosemary, vinegar and lemon juice . NatureIn, for example, are liquids based on buffered and reacted vinegar or in combination with lemon juice concentrate. It acts as a general antimicrobial and is effective against listeria. It can be added directly to the product surface or in brines.

Kathleen Glass, associate director of the Food Research Institute at the University of Wisconsin, is just as enthusiastic as Doyle about traditional preservatives. However, as the clean label movement gained unstoppable momentum over the past 10 years, she and her colleagues have been working with ingredient companies to help them develop the safest and most effective natural solutions.

"The ingredient companies we work with have been working very, very, hard over the past decade in trying to find what are going to be good alternatives," she explains. " What are going to be things that do work, and what are their limitations along with them?

"What we have to do as scientists is look at what are the active components that are really providing that extra margin of safety and what can we find from a natural source that gives us the same kind of components," Glass says.

Among additives, sodium nitrate—used to combat harmful bacteria in processed and cured meats, such as salami and ham—has long been the target of scrutiny. An increasing number of meat processing companies today

are substituting celery juice for nitrites to produce so-called "uncured" or "no nitrite-added" meat products.

"Celery extract is high in nitrate, which has to be converted to nitrite to be effective as an anti-botulinum" Doyle explains. "When you use celery extract, you need a bacteria culture to convert the nitrate to nitrite." He says that premature spoilage has occurred because of insufficient nitrite in uncured processed meat; the nitrite level is more difficult to precisely control when it's produced bacteriologically rather than synthesized in a laboratory.

But Glass pints out that over the years, clean label ingredient companies that use celery juice for sodium nitrite have "increased the efficacies" of the fermentation. "So we're getting a higher concentration in every gram of celery powder. As as a result, you don't have to add as much." she says. "That results in lower costs, but also less of a flavor impact."

Norbert Kaminski, a professor of pharmacology and toxicology at Michigan State University, agrees that obtaining the optimum amount of a naturally occurring antimicrobial can be problematic. Benzoic acid, for example, is a widely use antimicrobial preservative that's found in tomatoes, apples, blueberries and many vegetables. "The problem is that you need to have an effective concentration for these antimicrobials to have any activity," Kaminsky says. "And you have to be able to produce them economically, which can be challenging if you're trying to extract [antimicrobial compounds] from natural products.

'Natural' confusion

One hallmark of the clean label movement is the widespread belief that "natural" equates to safe, Kaminski observes. "That is a wrong premise," he insists. "Just because something is natural doesn't mean it's safe." The large number of outbreaks of foodborne illness from fresh produce (both organic and non-organic) bears this out.

Many people who seek out "clean food" prefer organically grown produce in large part because they believe it is free of synthetic pesticide residue. But in the absence of applied pesticides, "plants produce natural toxins to defend themselves against various stressors out in the field, whether insects or microbial pathogens," Kaminsky says. Some of these toxic compounds can be "very mutagenic," he emphasizes.

Washing conventionally grown produce before consuming will remove pesticide residue, according to Kaminski. "But those mutagenic compounds that organically grown vegetables are making—you can't wash those out," he maintains.

No definitive, comprehensive study has been published indicating that organic food is more likely than non-organic food to correlate with foodborne illness. The Centers for Disease Control and Prevention (CDC) does not systematically collect information on conventional versus organic production methods through its National Outbreak Reporting System, which depends on state and local health department to report foodborne illness outbreaks.

And because "clean label," unlike "organic," has not been defined by USDA or the FDA, it would be much more difficult to conduct a comprehensive research study on whether clean label formulations and production methods have a higher relative risk for foodborne illness than their conventional counterparts.

One study that has attracted notice indicates a positive, statistically significant correlation between the number of farmers' markets per million individuals and the number per million of total outbreaks and cases of foodborne illness. Published in the *American Journal of Agricultural Economics* in April 2018, the article "Farmers Markets and Food-Borne Illness" [academic.oup.com/ajae/article-abstract/100/3/676/4959753] companies

data on farmers' markets by state from the USDA' Agricultural Marketing Service and Farmers Markets Directory for the years 2004, 2006 and 2008-2013 with data from the CDC's Foodborne Outbreak Online Database (FOOD) for the same years.

"The correlation between farmers' markets and foodborne illness just persisted in whatever I did with the data," says the study's lead author Marc Bellemare, an associate professor of applied economics at the University of Minnesota. The correlation is most robust between farmers' markets and outbreaks and cases of norovirus, followed by campylobacter jejuni.

Receiving his research grant from University of Minnesota's Healthy Foods, Healthy Lives Institute [www.hfhl.umn.edu], Bellemare initially aimed to investigate the accuracy of a common assumption that consumers make today " that local organic food is healthier." Although farmer's markets don't just sell organic food, "I used that measure because I couldn't find a good measure of organic consumption," Bellemare explains.

While not adding to research on the safety of organic foods, Bellemanre's study does call into question consumer's health assumptions about "farm-to-table" trend, another aspect of the broader clan label movement.

No discussion of this movement can fail to take note of the growing consumer concern over genetically modified organisms (GMOs). Many consumers now expect clean label food to be GMO free.

In a May 2016 report "Genetically Engineered Crops: Experiences and Prospects," the National Academy of Science, Engineering and Medicine confirmed (again) that "the study committee found no substantiated evidence of a difference in risks to human health between currently commercialized genetically engineered crops and conventionally bred crops, nor did it find conclusive cause-and-effect evidence of environmental problem of the genetically engineered crops.

Although there is no evidence that non-GMO crops are more likely to harbor foodborne pathogens, Wayne Parrott, a professor of crop science at the University of Gerogia, has commented to the media on the detrimental removal of vitamins from certain breakfast cereals reformulated to be Non-GMO Project Verified.

Difficult to disabuse

In "The Food Police," a hard-hitting critique of those who attack "Big Food" without any knowledge of agribusiness or food science, Purdue's Lusk wrote, "The progressive food movement will not mean meaningfully help the poor or the environment of public health: it is a way for a modern generation far removed from the farm to give meaning to their lives in how they define themselves and others through food."

Because so many millennial and younger adult consumers today link their food choices with their moral values, not just long-term health, the food industry faces an uphill battle when it comes to convincing people that conventional food additives such as synthetic preservatives, as well as biotechnological innovations, help ensure better-for –you and safer food.

Bellemare, who wrote an op-ed piece in *The New York Times* about his farmer's market research, points out that while he received favorable feedback from many readers, a few were "pretty virulent in the denunciation of what I had written as being complete garbage," as he puts it.

We live in an era where the worst thing

that can happen to an individual is to get told that what you believe is fundamentally mistaken," Bellemare explains. "It is in the spirit of the times that people don't like to get told that they are wrong about something. They are very ego-invested in what they believe."

Nevertheless, some food scientists and other food safety experts are trying to educate the public and take on "chemophobic" activists, as Lusk calls them. In January 2015, for example, several members of the Institute of Food Technologists Student Association wrote "An Open Letter to the Food Babe," in which they called out her oversimplification of science.

"You have clamed to appreciate the work of food and nutritional scientists, but the language in your posts in insulting and attacks our profession—without really understanding what we do," they wrote. " In a time when sound science is needed more than ever, why do you so openly choose to ignore and vilify it?"

In his second book for the lay public, "Unnaturally Delicious: How Science and Technology Are Serving Up Super Foods to Save the World," Lusk extols the benefits of biotechnological innovation and directly addresses foodborne illness, which afflicts more than 15 percent of Americans each year, resulting in 3,000 deaths and 128,000 hospitalizations, according to the CDC, "The modern day quest for naturalness in food sometimes runs directly at odds with food safely," he wrote.

Besides educating consumers, the food industry needs to understand the importance of corporate social responsibility in gaining the trust of millennials, and Generation Z. Petipain emphasizes. "A company's reputation is reflected all the way down into minuscule details of a particular product, " she says.

So, for example, if consumers admire a food manufacturer's fair trade and hiring policies, they might be more inclined to believe that its product ingredient are safe and healthful.

As Petitpain explains, "This movement is an opportunity for companies to look holistically at their corporate responsibility plans and examine how effectively they've communicating their values and their vision of transparency."

—> The Safety of Flavor Ingredients (cont'd)

for our whole lives.

This presentation details the history of Flavor Safety Evaluation in the United States. It shows how the US FDA with the cooperation of the US Flavor Industry, created the architecture by which thousands of flavor substances have been evaluated and found safe under their conditions of intended use.

The power point based presentation includes the smelling of essential oils and their characterizing aroma chemicals. The process of steam and fractional distillation is shown and described. We will discuss the issue of natural and synthetic substances and review the methodology by which substances are determined to be safe. Attendees will learn about the role of a flavor chemist in food product development and how flavor companies work with food and beverage companies.

About Joe Piazza:

Joe is the VP of Operations at Comax Flavors, and has been in the flavor, color, and fragrance industry since 1971.

He graduated Cum Laude from Adelphi University with a major in business management in communications and a minor in accounting and chemistry.

Prior to joining Comax Flavors his career included work at H. Kohnstamm——>

———-> & Co. Amstar (Domino Sugar), Felton Worldwide, Fries & Cino and Technology Flavors and Fragrances. His broad industry experience include positions held in accounting, purchasing, quality control, operations and sales.