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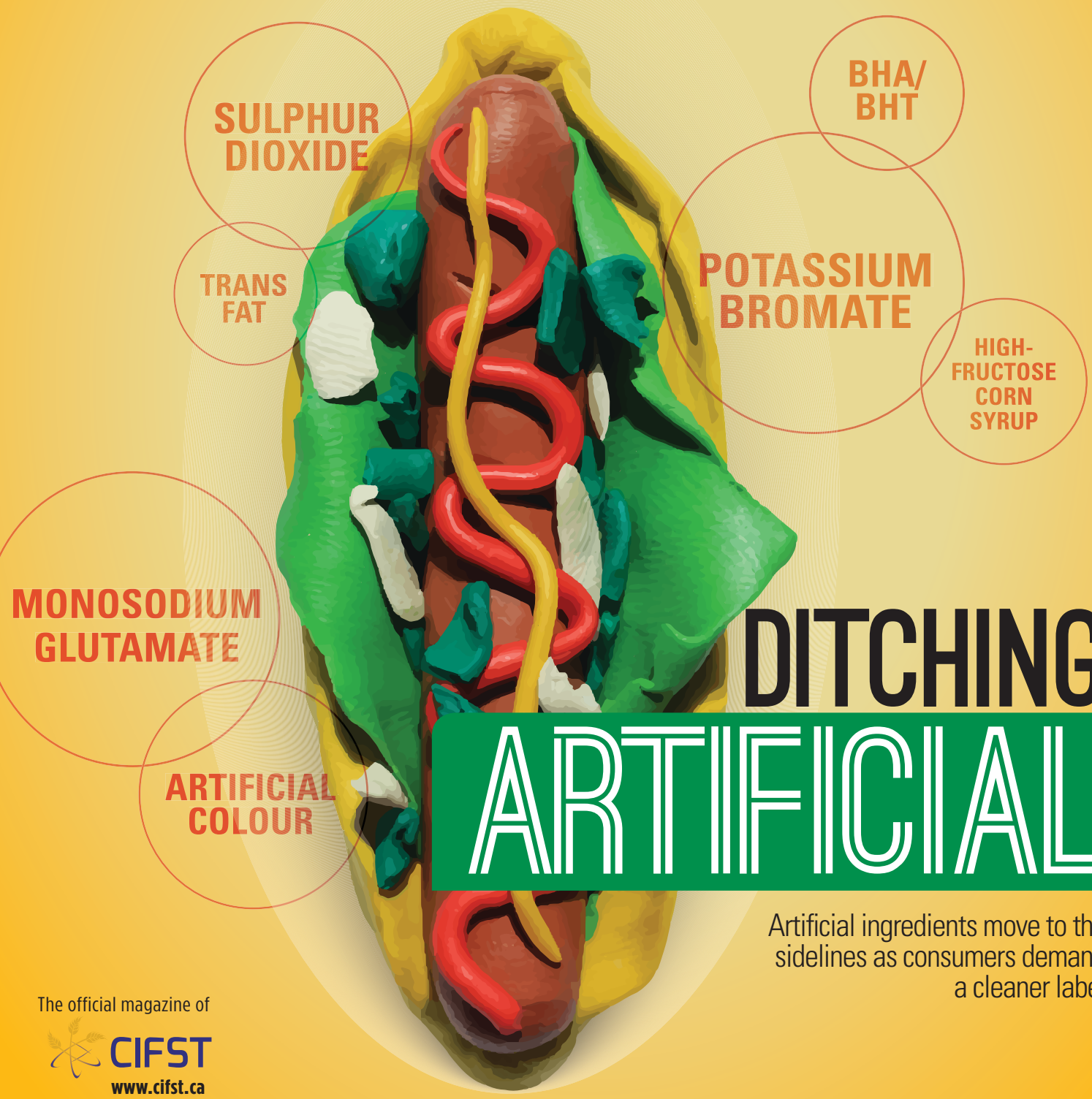
Canadian food Insights



DITCHING ARTIFICIAL

Artificial ingredients move to the sidelines as consumers demand a cleaner label

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The Artificial Enemy 18

Mintel predicts 2016 will be a pivotal year during which companies that have yet to remove artificial ingredients from products will face scrutiny or lose customers.

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Theresa Rogers

EDITOR FOR
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ARTIFICIAL INTELLIGENCE

As we head into the holiday season, the days are short and so is time.

I'm planning a holiday party and with almost 40 people who have RSVP'd, it's going to require a lot of food and drinks. I don't dislike being in the kitchen, but with a full-time job and family, I also don't have time to spend hours and hours slaving away at nibblies and dessert for all of the hungry people I invited over. I will make some things, but yes, I will also take my points and head to the grocery store and buy all of the yummy things I need to serve my guests. That includes boxes of delicious hors d'oeuvres I couldn't hope to replicate in my kitchen. I've bought and served them before and they, unlike anything I could produce, are always perfect and consistent in looks and taste. This is important when you want to make a good impression.

I imagine I am not unique in this. That is how and why this industry flourishes.

Now, what I do think about lately is what is inside of all that stuff I will be buying. Is it really bad or is it something I can live with on the odd special occasion or on those days when the kids only want chicken fingers or hotdogs and not the fresh stuff my husband and I are eating? Finding that "artificial intelligence" will take some time.

This is an issue that has really taken off the past couple of years and is collecting steam every day as greater numbers of manufacturers and restaurants pledge to remove at least some artificial ingredients. It is the top 2016 trend as identified by Mintel in our trends story: artificial ingredients are out. Fresh, clean label, pronounceable – however you say it – is in.

It's going to be a challenge. Those of you in the industry know adding, removing or replacing ingredients takes a lot of time and effort. Consumers don't know that nor do they care. They just want to be able to pronounce what is in their food and know that it's not likely to cause them cancer in 30 years. It's a challenge the industry absolutely must take on or risk being sidelined by competitors who do.

Like I said, it's been on my mind a lot. There is a saying that great bodies are made in the kitchen, not the gym. I lost 50 pounds in the past two years improving my diet and exercise. I also have a nine-year-old who loves his sweet and salty snacks. It would be nice to know food companies are thinking about it too.

Sincerely

Theresa Rogers

Michael T. Nickerson, Ph.D., P.Ag.
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Welcome everyone, to the latest edition of *Canadian Food Insights* – just in time for the holidays. Reflecting back on the past year, the Canadian food and beverage sector has experienced a tremendous amount of growth and success, something we can all be proud of. However, I predict next year will be even better as we enter the International Year of Pulses, and work to promote growth, awareness and process/product innovations involving Canadian pulses (i.e., peas, lentils, chickpeas, faba beans and beans). In this issue of *Canadian Food Insights*, we have another three exciting review articles. The first, entitled, *The Potential of Germination (Sprouting) for Improving the Nutritional Properties of Cereals and Pulses,* highlights how this non-thermal treatment can improve the nutritional attributes of cereal and pulse grains. The second, entitled, *Positioning high quality plant-based protein sources for the food industry: do we need to adopt new approaches?,* explores the nutritional value of plant proteins and methodological approaches to assessing them. And finally the third, *Is food a sophisticated ordered tool to deliver nutrients?*, discusses how the structure of the food matrix can impact the nutritional properties. The issue also contains the final installment of our "Clean Labels" saga within our Regulatory Arena section, as well as many other success stories to keep you up-to-date from sea to sea. As always, I would like to thank our Editorial Advisory Council and the team at Dovetail Communications for their outstanding work. Not sure how others feel, but as I am getting ready for the holidays, all I seem to want for Christmas is more and more of *Canadian Food Insights*. Sit back and enjoy. We hope you have a safe and happy holiday.

Sincerely

Michael T. Nickerson

food EVENTS 2016

Jan. 5-6
Southwest Agricultural Conference
RIDGETOWN, ON

Jan. 12-14
Dairy Farmers of Ontario Annual Meeting
TORONTO, ON

Jan. 26-28
International Poultry Expo and International Feed Expo
ATLANTA, GA

Jan. 28-31
Guelph Organic Conference
GUELPH, ON

Feb. 17-18
Beef Farmers of Ontario Annual Meeting
TORONTO, ON

Feb. 21-23
Annual Meat Conference
NASHVILLE, TN

Feb. 22-23
CIFST National Conference
BURNABY, BC

PEOPLE PROFILE

An Education in Food

CENTRE FOR FOOD PROVIDES STUDENTS WITH FIRST-HAND EXPERIENCE

Text by Doug Wintemute

Plan for the surrounding gardens and cultivated agricultural landscape. Photo credit: Tom Arban

Surrounded by an orchard, greenhouses and vegetable fields, the Centre for Food (CFF) at Durham College in Oshawa, ON, is doing its part to redefine school field trips. By following the guiding concept of field-to-fork, the centre encourages its students to engage in the various sectors that converge within the food industry, having them gain a well-rounded appreciation for food and the many processes involved in bringing it to the plate.

"The idea with the Centre for Food was that this would be a centre within Durham region that brings the farming community, the dining community and the learning community together," says David Hawey, CFF Chair and Professor of Culinary Management. "We want to have the opportunity to take students into the field and say, 'this is how food grows, this is what goes into it and this is how you can benefit from it.'"

Within its new, state-of-the-art, 34,000-sq. ft. facility, the CFF promotes local food, sustainability (both in practice and design) and industry collaboration. The centre is proud of Durham region's strong agricultural ties and tries to support its local farmers and producers wherever and whenever it can. In addition to that, the centre grows its own produce, something quite unique among other culinary schools.

"Whereas some schools are looking at using local food, we're actually producing our own," says Hawey. "There are horticulture programs with decorative plants, but there 200 apple trees in our front yard that are growing; there are herb gardens as you walk up to the centre. From the main building, you walk through the fields, past the tomato plants and pepper plants and corn plants. You can feel more at one with food."

Students prep ingredients in the large quantities kitchen. Photo credit: Tom Arban

Each room in the energy-friendly centre is built with flexibility, adaptability and transparency in mind. Open concept classrooms and kitchens feature transportable equipment, allowing for more versatility in the space and speak to the centre's commitment to staying ahead of the ever-improving technological environment. But flexibility and adaptability are more than simply design concepts. A centre-wide dedication to collaboration provides students with an understanding of each stage in the food cycle, seen through to its fruition at Bistro 67, the CFF's teaching-inspired restaurant.

"The students that grow the food in the greenhouses starting in January and saw it get planted in our fields in the spring, also help to harvest it. Then it comes into the kitchens and our students cook it and serve it that night," says Hawey. "From growing it, to cooking it, to serving it, we're tying all of those programs together on three-and-a-half acres of land, to bridge the gap so that people understand what the other side is doing. And it's all happening right here."

P.E.I. SCALLOPED POTATOES WINS LAY'S CANADIAN CONTEST

The P.E.I. Scalloped Potatoes flavour has been selected as the 2015 winner in the Lay's Do Us a Flavour contest.

Winner Jordan Cairns was inspired by Atlantic Canada's reputation for potato cultivation as well as a fond memory of Friday night family dinners to create his P.E.I. Scalloped Potatoes flavour. Jordan will receive $50,000 plus one per cent of his flavour's future sales.

"I'm excited to be named this year's winner," says Jordan. "It's incredible to think that a flavour inspired by a childhood memory will join the Lay's lineup in stores across Canada."

Earlier this year, Lay's asked Canadians to submit their ideas for the next great potato chip flavour inspired by a region in Canada. In August, four finalist flavours were revealed and Canadians were invited to select the winner by trying all four and voting from August 11 to September 30.

The Lay's Do Us a Flavour contest has been held in numerous countries around the world. Since 2013, the Canadian contest has received more than 2.7 million flavour ideas from across the country.

BEVERAGE MANUFACTURERS TO REDUCE CALORIE CONSUMPTION

Canada's beverage manufacturers and Canadian Beverage Association (CBA) launched the Balance Calories initiative in October. The program is aimed at reducing the number of calories Canadians consume from non-alcoholic beverages by 20 per cent over the next decade through product innovation and marketing. This commitment includes all non-alcoholic refreshment beverages excluding milk and other dairy products, hot coffees and teas.

"Balance Calories highlights the commitment of Canada's non-alcoholic beverage industry to support balanced, healthy lifestyles for all Canadians," says Jim Goetz, President, Canadian Beverage Association.

The Balance Calories initiative is designed to increase consumer awareness of calorie balance through a national advocacy program and increase access to reduced calorie beverage options.

Over the next few months, CBA members, the Conference Board of Canada, and other public, private and not-for-profit stakeholders will determine appropriate benchmarks, measurement criteria and specific immediate and long-term action items to support Balance Calories.

As program benchmarks and measurement criteria are confirmed, and the program moves into the execution phase, CBA and Conference Board of Canada will keep stakeholders and the Canadian public up-to-date on its progress and roll-out plans.

Canada's First Indigenous Pear

After more than 30 years in development, Canada finally has its own indigenous pear variety. Bred in Ontario by Agriculture and Agri-Food Canada, the Cold Snap pear was prominently displayed at the The Royal Agricultural Winter Fair's opening ceremony in November.

"We call Cold Snap pears 'Winter's Favourite Fruit,'" says Matthew Ecker, Sales and Business Development Manager for the Vineland Growers' Co-operative Ltd. "Cold Snap pears can be stored longer, which makes them available to Canadian consumers throughout the winter."

The sweet-tasting large pear is currently in production in Ontario and in Nova Scotia's Annapolis Valley, with plans to have growers producing it in British Columbia in the future.

"2015 is our first commercial harvest and we hope to double production every year for the next five years," continues Ecker. More commercial growers are needed in order for this Canadian fruit to be available across the country.

food EVENTS 2016

Feb. 24
BCFT Suppliers Night
BURNABY, BC

Feb. 27-28
Bakery Equipment Manufacturers and Allieds Winter Summit
CHICAGO, IL

Feb. 28-Mar. 1
Restaurants Canada Trade Show
TORONTO, ON

Mar. 1-3
Canola Council of Canada Convention
SAN DIEGO, CA

Apr. 6-7
Canadian Dairy XPO
STRATFORD, ON

Apr. 20-21
12th Annual Food Safety Summit
TORONTO, ON

Apr. 21
CIFST Quebec Section Suppliers Show
LAVAL, QC

Global Flavour Report Features Emerging Trends and Flavours

McCormick & Company has unveiled its annual Flavour Forecast, revealing the tantalizing trends that will shape culinary exploration and innovation around the globe.

Among the emerging trends is a spotlight on underexplored Southeast Asian fare – Malaysian and Filipino – and the evolution of our insatiable appetite for spicy. Also featured are pulses which serve as a protein-packed canvas for delicious flavours – fitting as the UN celebrates 2016 as the International Year of the Pulse.

These trends offer a taste of 2016 and beyond:

Heat + Tang – Spicy finds a welcome contrast with tangy accents to elevate the eating experience.
- *Peruvian chilies* like rocoto, ají amarillo and ají panca paired with lime
- *Sambal sauce* made with chilies, rice vinegar and garlic

Tropical Asian – The vibrant cuisine and distinctive flavours of Malaysia and the Philippines draw attention from adventurous palates seeking bold new tastes.
- *Pinoy BBQ*, a popular Filipino street food, is flavoured with soy sauce, lemon, garlic, sugar, pepper and banana ketchup
- *Rendang Curry*, a Malaysian spice paste, delivers mild heat made from chilies, lemongrass, garlic, ginger, tamarind, coriander and turmeric

Blends with Benefits – Flavourful herbs and spices add everyday versatility to good-for-you ingredients.
- *Matcha's* slightly bitter notes are balanced by ginger and citrus
- *Chia seed* becomes zesty when paired with citrus, chili and garlic
- *Turmeric* blended with cocoa, cinnamon and nutmeg offers sweet possibilities
- *Flaxseed* enhances savoury dishes when combined with Mediterranean herbs

Alternative "Pulse" Proteins – Packed with protein and nutrients, pulses are elevated when paired with delicious ingredients.
- *Pigeon peas,* called toor dal when split, are traditionally paired with cumin and coconu
- *Cranberry beans*, also called borlotti, are perfectly enhanced with sage and Albariño wine
- *Black beluga lentils* are uniquely accented with peach and mustard

Ancestral Flavours – Modern dishes reconnect with native ingredients to celebrate food that tastes real, pure and satisfying.
- *Ancient herbs* like thyme, peppermint, parsley, lavender and rosemary are rediscovered
- *Amaranth*, an ancient grain of the Aztecs, brings a nutty, earthy flavour
- *Mezcal* is a smoky Mexican liquor made from the agave plant

Culinary-Infused Sips – Three classic culinary techniques provide new tastes and inspiration in the creation of the latest libations.
- *Pickling* combines tart with spice for zesty results
- *Roasting* adds richness with a distinctive browned flavour
- *Brûléed* ingredients provide depth with a caramelized sugar note

Connecting Colour with Food and Drink

Tealeaves, in collaboration with Pantone, launched an online exhibition in November that showcases the influence colour has on food and drink experiences.

The exhibit, paletteforyourpalate.com, profiles Tealeaves' Whole Leaf Pyramid Teabag collection and displays the tea-infused creations of 34 world-renowned culinary, pastry and mixology artists. The exhibit also includes a documentary that explores the potential of colour to excite and convey stories and values.

"Colour has the ability to draw us in and immediately create an emotional connection to the things we love," says Laurie Pressman, Vice President of Pantone Color Institute. "By tapping into our research on the psychological messages and meanings of colour and infusing it with tea, now when consumers pick up that box of tea on the shelf, it will truly resonate with them as it will evoke certain moods."

For this online exhibit, chefs and mixologists were asked to create a recipe inspired by Tealeaves' Whole Leaf Pyramid Teabag collection, PANTONE Color, and an associated, single mood. The final colour of each cocktail, entree and dessert was to be derived naturally from the ingredients alone.

PaletteForYourPalate culinary, pastry, and mixology creations will be available on the menu at various luxury hotels and establishments across the United States and Canada.

COMPANY PROFILE

Delavau Supplies Food, Pharma and Nutritional Technologies to Major Brands

FOOD DIVISION FOCUSES ON CLEAN LABEL, FRESHNESS, AND FORTIFICATION SOLUTIONS

Text by Kelly Townsend

In a market that is becoming increasingly health-conscious, finding the balance between creating a product that meets a consumer's health standards and one that still meets their taste expectations can be a challenge.

Delavau Food Partners is a company that creates those types of solutions. Described as a "know-how" company by Vice-President and General Manager Jeff Billig, Delavau works with food companies, such as nutritional bar companies or coating manufacturers, to solve problems using existing ingredients to give products a new functionality, such as an extended shelf life, clean label reformulation, or calcium fortification. "We're not sitting back and creating products on our own," says Billig. "Much of what we do is market-driven, customer-driven... what we're really trying to do is let them direct our effort."

Sometimes a customer request is not as clear-cut as extending a product's shelf life. At times, Billig says, customers will bring additional challenges into the mix, such as a cost limit or specific ingredients that can't be included on a label. "Because of that, we need to be experts in all of the various ingredient technologies that exist out there so we can choose the best combination of ingredients that are going to create a functionality and the outcome as defined by our customers," says Billig.

A more recent market trend, Billig says, is a renewed interested in creating a calcium claim in consumer products. Delavau's response is its patented calcium fortification technology, introduced in August 2015. Delavau researched the "optimal particle size and surface area of the calcium," which allows the company to incorporate calcium into a variety of confectionery and bakery systems without compromising the taste of the product or the efficiency of the manufacturing process.

"Companies that are meeting a health halo are definitely interested in providing a holistic experience for their customers, and many of those companies are interested in adding calcium as part of that holistic offering," Billig says.

Not only has the response from customers been positive, Billig says Delavau has been approached by various manufacturers curious to know if the fortification technology used for calcium can be applied to other vitamins and minerals, as well as proteins and fibres.

"What we're finding is that our customers, or potential customers, are finding other ways to look at adopting the technology that goes beyond that traditional perspective," Billig says. He gives the example of a company that was interested in utilizing the calcium technology to reduce the amount of sugar in a chocolate product by replacing it with calcium, without compromising the product's sensory experience. "That was an interesting take that, quite honestly, we hadn't thought of ourselves."

Mintel Intel

2016 GLOBAL FOOD & DRINK TRENDS

MINTEL'S TEAM OF GLOBAL FOOD AND DRINK EXPERT ANALYSTS HAVE IDENTIFIED AND ANALYZED 12 KEY TRENDS SET TO IMPACT THE GLOBAL FOOD AND DRINK MARKET IN 2016.

NAVIGATE THE TRENDS

As lifestyles shift and global markets influence how, why and where we buy and consume goods and services, the ever-evolving consumer landscape tries to keep up. Natural disasters, the media, tightly held misconceptions, mass-connectivity and a draw to simplicity are influencing food and drink habits worldwide like never before.

Here, our team of global expert analysts have identified and analyzed 12 key trends set to impact global food and drink markets in 2016 – your map to navigate the road ahead. Allow us to guide you through the most compelling and category-changing food and drink trends as they emerge, mainstream and establish in consumer markets across the globe.

Whether you're just starting out or a 'seasoned traveller', opportunities abound in the words that follow. Behind every trend is comprehensive market, competitive and consumer data, as well as in-depth analysis.

The journey begins...

GLOBAL FOOD & DRINK TRENDS 2016

ARTIFICIAL: PUBLIC ENEMY NO.1

Consumer demands for natural and 'less processed' food and drink are forcing companies to remove artificial ingredients. Products that have yet to do so will face scrutiny – or worse – from consumers who are looking for natural formulations with recognizable ingredients.

ECO IS THE NEW REALITY

Drought, worries about food waste and other natural phenomena not only affect the worldwide food and drink supply, but influence preparation and production. In 2016, sustainability evolves from being good for the bottom line to being a necessary new product development consideration for the common good.

FROM THE INSIDE-OUT

As the adage goes with beauty, 'It's what's on the inside that counts'. Consumers are recognizing that diets can connect with the way they look and feel. This places new emphasis on packaged products that are formulated to help people's physical appearance as well as their personal wellness, creating a market for products enhanced with everything from collagen to probiotics.

ALTERNATIVES EVERYWHERE

Veggie burgers and non-dairy milks have escaped the realm of substitutes primarily for people with dietary concerns and followers of vegetarian diets. Instead, the growing ranks of novel protein sources and potential replacements appeal to the everyday consumer, foreshadowing a profoundly changed marketplace in which what was formerly 'alternative' could take over the mainstream.

FOR EVERY BODY

For many, fitness is simply about becoming more active. The rising promotion of athletic programs that encourage consumers to get and stay active showcases a parallel need for food and drink that helps consumers get acquainted with sports nutrition, including energy, hydration and protein. This creates an opportunity for communication and product ranges that progress alongside people's activity levels and goals.

BASED ON A TRUE STORY

Consumers have been romanced by product origin, ingredients or inspiration stories. With similar claims made by legitimately hand-crafted as well as mass-produced products, this proliferation and occasional propagation will find consumers and regulators alike seeking products with verified claims.

Natural disasters, the media, tightly held misconceptions, mass-connectivity and a draw to simplicity are influencing food and drink habits worldwide like never before.

GLOBAL FOOD & DRINK TRENDS 2016

E-REVOLUTION: FROM CARTS TO CLICKS

Online shopping, apps and delivery services are transforming consumers' access to deals, niche offerings and even full meals. While the internet has not yet vastly changed the landscape of grocery shopping, innovations encourage consumers to think outside traditional physical retailers.

GOOD ENOUGH TO TWEET

The rise of food-centric media has sparked new interest in cooking, not only for the sake of nourishment, but for the purposes of sharing one's creations via social media. This finds people taking divergent paths: some hope to become well-rounded enough to compete on popular television programs, while others privately cultivate specialities ranging from cupcakes to curries. Either way, people are cooking to share with friends and followers.

TABLE FOR ONE

Across age groups, more consumers are living in single-person households or occasionally eating meals alone. These meals for one require right-sized products and packaging as well as promotions that further erode any stigma of dining solo.

DIET BY DNA

Interest in natural and 'getting back to basics' has boosted ancient grains and superfoods, fostering a principle that age-old staples are better than today's manufactured options. Interest in historical ingredients suggests that people could make efforts to unlock the keys to their personal physiology and design diets by connecting with their own ancestry or genetic make-up.

FAT SHEDS STIGMA

Consumers' negative stereotype that any and all fat content is evil has begun to diminish. The awareness of the many sources of good and bad fats is ushering in a paradigm shift in which fat content is not the first and foremost consideration – and barrier – in the search for healthy products.

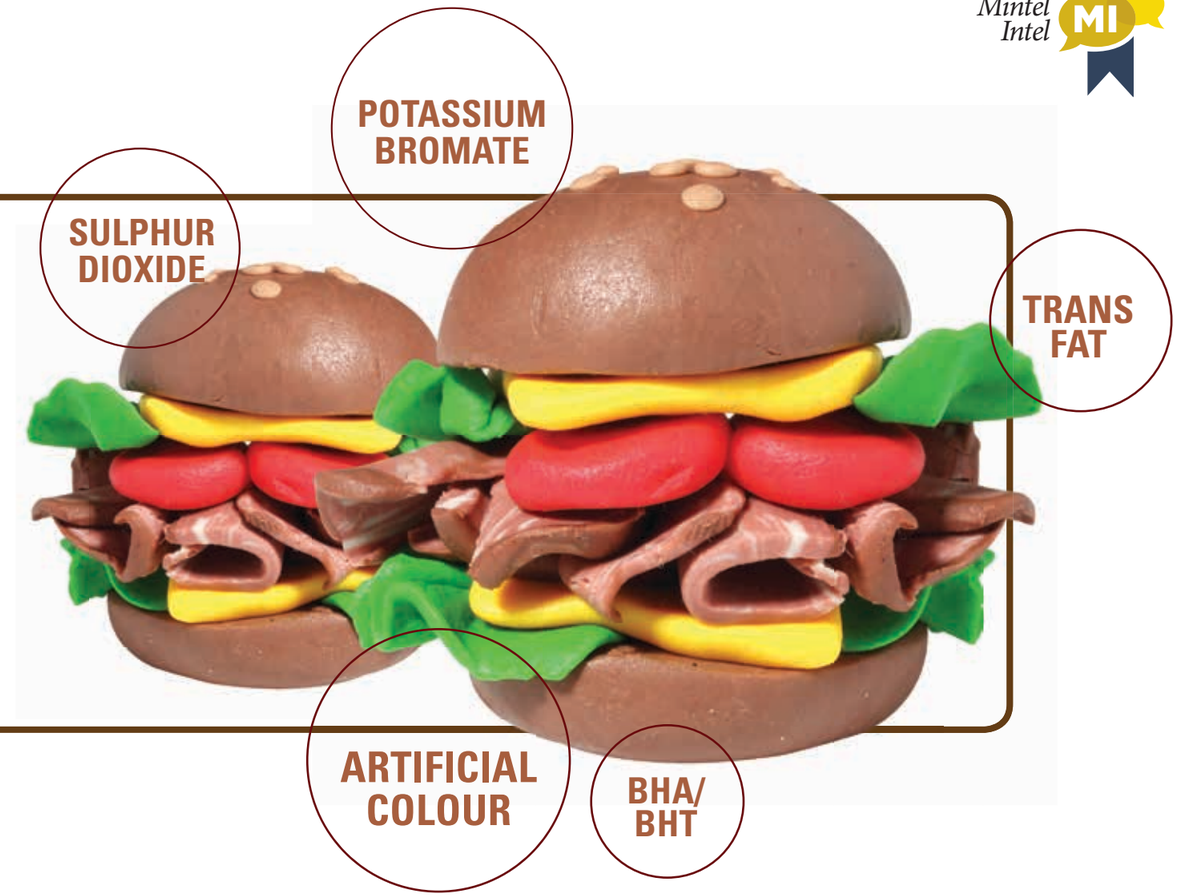
EAT WITH YOUR EYES

Flavour has long been the core of innovation, but more visual and share-focused societies call for innovation that is boldly coloured and artfully constructed. Finding inspiration in global foodservice offerings, brands can experiment with vibrant colours and novel shapes to make packaged products worthy of consumer praise and social media posts.

Behind every trend is comprehensive market, competitive and consumer data, as well as in-depth analysis.

PRODUCTS WITH ARTIFICIAL INGREDIENTS FACE SCRUTINY

- OR WORSE - IN 2016



Text by Jenny Zegler

MINTEL RESEARCH FINDS THAT 42% OF CANADIAN INTERNET USERS AGES 18 AND OLDER SAID **EATING LESS PROCESSED FOODS** WAS PART OF THEIR PERSONAL HEALTH AND WELLNESS GOALS FOR 2015.

Consumers' increasing skepticism of food and drink products that have ingredient lists that are lengthy and/or contain unrecognizable items is leading to preferences for products that do not contain artificial ingredients. This momentum toward natural and "less processed" food and drink is driving consumers to deem "Artificial: Public Enemy No. 1," as explored in Mintel's 2016 Global Food + Drink Trends.

Consumer preferences for food and drink that is "less processed" is spreading. Mintel research finds that 42% of Canadian internet users ages 18 and older said eating less processed foods was part of their personal health and wellness goals for 2015. In the U.S., 53% of internet users ages 18 and older who are solely or partly responsible for shopping avoid buying processed food.

Consumers also have opinions regarding which categories would benefit from removing ingredients/contents. Processed meats top the list, with 52% of Canadian internet users ages 18 and older who use free-from foods and/or beverages wanting shorter ingredients lists on cold cuts and other meat products. The broad category of snacks, which is defined to include chips, granola bars and chocolate bars, places second, as 47% of Canadian free-from food buyers would like simpler ingredient lists on snacks. The leading categories are followed by frozen meals (42%), sauces and condiments (32%) and desserts (29%).

One of the priorities for consumers who are looking for "less processed" food and drink is to reduce or to avoid artificial ingredients, such as artificial sweeteners, colours and flavours. These behaviours have inspired U.S.-based manufacturers and foodservice brands, including Hershey's, PepsiCo and McDonald's, to pledge to reformulate and remove artificial ingredients from certain products or categories in the coming years. The announcements represent proactivity from companies, while still being honest that reformulation will take time. Despite potential waiting periods, the company announcements serve to reassure consumers that their desires are being heard.

With this momentum in mind, Mintel predicts that 2016 will be a pivotal year during which companies that have yet to remove artificial ingredients from products will face scrutiny at minimum, or, more seriously, run the risk of boycotts.

For companies with large portfolios, some categories are on consumers' watch lists more than others. In the beverage category, 62% of Canadian adults associate carbonated soft drinks with the term "artificial." Likewise, 53% of Canadian adults align energy drinks with the term "artificial." The two categories fare worse in comparison to fruit juice or juice drinks, which are deemed "artificial" by 26% of Canadian adults, and a mere 4% who identify bottled water as "artificial."

In this environment, products with artificial ingredients run the risk that consumers will switch to natural formulations instead of compromising their preferences or waiting for reformulations. In fact, 71% of Canadian internet users ages 18 and older who consume energy or sports drinks agree that they prefer to drink more natural beverages (eg, milk, water, coconut water) instead of sports drinks.

As an increasing number of companies offer natural varieties or promise that reformulated products will be coming soon, consumer expectations will grow. This will lead to interest in more specific claims. More manufacturers may follow the lead of companies like Canada's Love Child Organics and offer products with "nothing artificial" claims. The succinct statement directly communicates formulation and reassures shoppers, giving them the security that a product is the opposite of a public enemy.

Jenny Zegler
is Global Food & Drink
Analyst at Mintel

62% OF CANADIAN ADULTS ASSOCIATE CARBONATED SOFT DRINKS WITH THE TERM "ARTIFICAL".

HOW TO SUCCEED IN FOOD PRODUCT DEVELOPMENT USING SOCIAL LISTENING

Text by Todd Grossman

Food preferences differ because of many different reasons – demographics, seasons, upbringing. Even the region we live in shapes what we eat on a daily basis. While many people prefer lighter foods or fruit over the summer, winter is the time for savoury foods and spices.

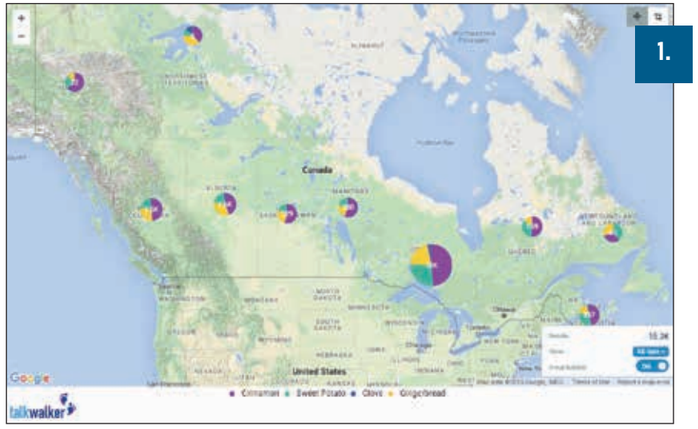
Social listening allows product managers, developers and marketers in the food industry to keep track of changing customer tastes and preferences, detect upcoming trends and adapt their product portfolio to those changes in order to boost sales figures.

Based on a recent report published by Talkwalker, here are three steps for food brands to leverage social media insights for the successful development and launch of new products.

1. Recognizing regional trends

In the example here, mentions for typical fall and winter flavours were broken down according to region – to account for the French- and English-speaking regions, the search was conducted in both languages, results are for a seven-day period mid-November. Cinnamon is the clear winner in terms of "winter flavours", accounting for half of all online mentions across most provinces. The exception here is Newfoundland, where results are split evenly between cinnamon, sweet potato and gingerbread as favourite winter foods.

A breakdown for mentions of typical fall or winter flavours across Canada:

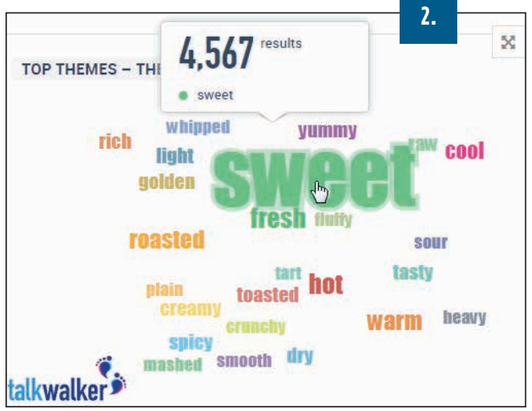


Keeping track of such trends or the overall conversation of food and nutrition allows food manufacturers to identify popular flavours or new trends as early as possible. The insights gained from social media monitoring allow food companies to supplement their research and development of new products, shortening the product development process and saving producers time and money.

2. Finding what customers care about

A theme cloud for popular winter flavours and tastes across Canada:

2.



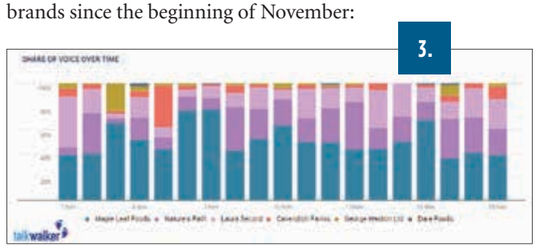
The theme cloud above shows which terms are mentioned in context with the "winter flavours" mentioned earlier the most. Aside from sweet, "roasted" and "light" are two of the most commonly-used terms in the food discussion. While a roasted flavour seems to be very popular, at the same time people are looking for light foods to eat over the coming holiday season. For food companies looking to develop new products, an overview of the top themes of online conversations offers insight into customer interests and helps to better segment the market by creating buyer personas.

After a product launch, monitoring online campaigns about a new product or flavour allows food manufacturers to gather immediate customer feedback – packaging, taste and texture, overall experience are all issues that customers like to discuss on social media. For food manufacturers, this can be a treasure trove of customer insights, allowing them to adapt their products or communication strategies according to customer preferences in real-time to ensure a product's success.

3. Keeping track of competitors

A comparison of online mentions for major Canadian food brands since the beginning of November:

3.



With the food industry developing so quickly and everyone trying to ride the latest trend, it is obvious that companies need to keep track of their competitors' performance just as much as their own.

In the example below, the distribution of mentions for selected Canadian food brands show that Maple Leaf Foods has largely been dominating the conversation from beginning to mid-November. Mentions doubled around November 6 and 7, when the company had to recall one of its products. After a product launch, monitoring the online conversation for a brand is helpful is assessing how much attention a new product received and finding out what people think about the new item.

Social listening allows food companies to easily compile social intelligence and benchmark their products or campaigns against competitors to gauge the success of a new product. It also enables them to find best practices to use for future campaigns.

In the fast-paced environment of the food industry, keeping track of new trends to develop and adapt products according to customer preferences is essential for business success. Social media is full of these and other important insights that can help companies not only to develop exactly the products customers are looking for, but also to market them successfully – boosting customer satisfaction and sales figures at the same time.

Todd Grossman is
CEO Americas,
Talkwalker

Advertorial

VWR We Enable Science

Solutions for Automated Water Pathogen Detection

by Dr. R. Stephen Brown, Associate Professor, Department of Chemistry and the School of Environmental Studies at Queen's University, Ontario, CA

Safe Water is a Critical Need

Water plays a central role in our lives, and access to safe water is essential for everyone – from those living in the world's largest cities to the smallest towns and as a key element of industrial processes producing everything from the most basic foods to today's most advanced microelectronics. Water destined for human and industrial consumption is required to be quality tested for a wide variety of contaminants, including potentially harmful microorganisms. While many water quality parameters such as pH, chlorine and turbidity can be measured in near real-time by on-line measurement instrumentation, microbiological testing presents a unique challenge. The requirement to detect a single *E. coli* cell in a 100mL water sample has been compared to the challenge of finding a single coffee bean in 40,000 Olympic-sized swimming pools.

The majority of microbiological water quality tests rely on traditional microbiological methods that were developed decades ago. Water samples are sent to a laboratory where they are filtered and subsequently placed into a growth culture media that is typically incubated for 24 hours. After the incubation period, each sample is inspected by a trained technician for signs of bacterial growth. Chemical additives in the growth media cause colonies of specific target bacteria to change color or to appear fluorescent under ultraviolet light. While these methods are the current gold standard, they require 24-48 hours for samples to be transported, analyzed and the laboratory results to become available. In the event of contamination, delays in receiving test results increase the risk of public exposure, requiring costly remedial action or product recalls.

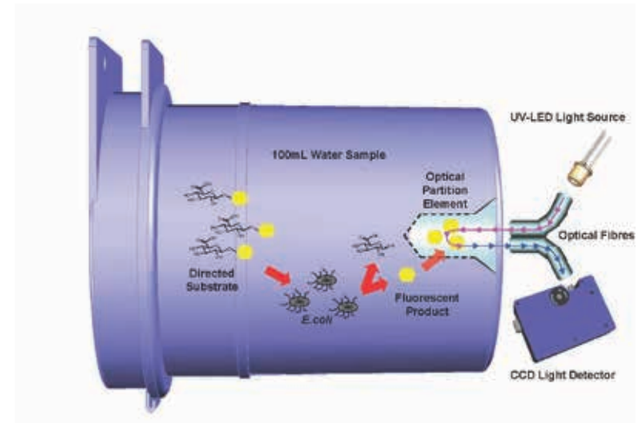
The Innovation: Introducing the TECTA Automated Microbiology Solution

The impact of highly-publicized events involving contamination of municipal water supplies has driven the need to develop new microbiological test methods that are faster and easier to use than traditional methods, while maintaining the sensitivity and reliability that have been trusted for decades.

In 2001, a consortium of university researchers and water quality experts proposed an innovative approach – a novel way of automating the test by using a polymer-based optical sensor to detect the same types of fluorescent indicators of bacteria used in the trusted current methods. Pathogen Detection Systems, Inc. was subsequently formed to provide municipalities and industries worldwide with the automated microbiology solutions that were developed as a result of this research.

ENDETEC VEOLIA

U.S. EPA Approved



The innovative capabilities of the TECTA system are made possible by a patented polymer based optical sensor, the "Optical Partition Element", that is built into every test cartridge. Each cartridge contains pre-measured amounts of growth media that support the enrichment of any target bacteria that are present in the sample. As target bacteria such as *E. coli* or Coliforms begin to multiply, they emit a specific enzyme that interacts with a proprietary chemical substrate in the cartridge, releasing fluorescent molecules from the substrate. These fluorescent indicators rapidly move from the water sample into the polymer optical sensor located within the cartridge, enabling automated detection by a low-cost ultraviolet optical detection system that is built into the TECTA instrument.

The novel combination of the polymer-based optical sensor and ultraviolet optical detection system provides several key advantages. The fluorescent indicators are extracted and concentrated within the polymer of the optical sensor, facilitating both rapid detection at the earliest possible time and eliminating the risk of off-color samples or turbidity within the water sample obscuring the fluorescent indicator. When placed in the TECTA instrument the test is monitored continuously throughout the incubation process – providing alerts of contaminated samples as soon as possible and eliminating the requirement to wait until the end of a fixed incubation process (typically 18-24 hours). This unique early alerting capability allows the system to provide results within 2-18 hours, depending on the level of sample contamination. In addition to a "presence/absence" result, the system is capable of providing an estimate of the number of bacteria that were present in the original sample – an important indicator of the level of severity of an adverse microbiological test result.

Dr. R. Stephen Brown's research is focused on instrumentation and methodology related to water quality monitoring and environmental toxicology. He has published over 80 peer-reviewed papers, five book chapters, and has six issued patents. He has given many invited seminars and conference presentations on his research and on technology transfer. He co-founded the company Pathogen Detection Systems, now a subsidiary of Veolia Environment in the ENDETEC group. He continues to work with ENDETEC as Chief Scientist to develop and commercialize new water monitoring technologies.

TECTA™ Automated Microbiology System

TECTA is the first automated microbiological testing system approved by U.S. EPA for regulatory compliance testing of municipal drinking water systems required under the Total Coliform Rule.

The system saves precious time and money by being able to test onsite without the need for a microbiologist. It requires much less manual labor and use of disposable products – the test cartridge is pre-filled with all required test reagents eliminating the need for any handling, dilution, or mixing of reagents for test samples.

- Shows positive results with single cell sensitivity and provides an estimate of the number of bacteria present
- Simplifies the FSMA process, easily handling the increased number of tests
- Approved by the U.S. EPA for drinking water regulatory compliance monitoring

Description	Cat. No.	Price
TECTA Automated Rapid Microbial Detection System	**10218-898**	Ea./ **19,750.00**
Combined *E. Coli* and Total Coliform Test, 100 mL	**10220-374**	Box 48/ **472.00**

The Potential of Germination (Sprouting) for Improving the Nutritional Properties of Cereals and Pulses

Gebremedhin Gebreegziabher | Constance Chiremba | Andrea Stone | Robert Tyler | Michael Nickerson*

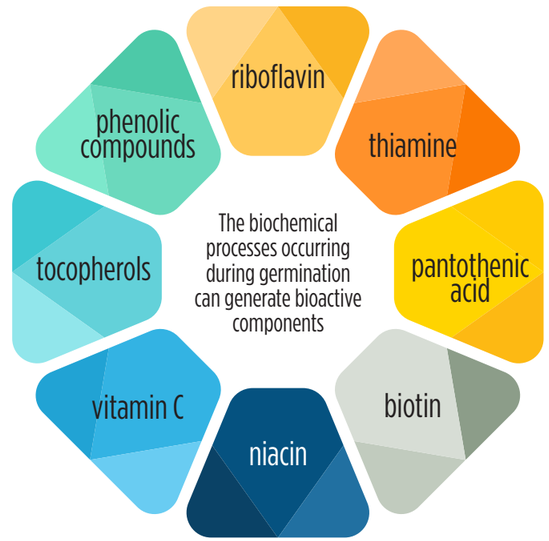
A variety of factors reduce the nutritional value of cereals and pulses, such as enzyme inhibitors and other anti-nutritional components which limit protein digestibility and quality, and metal chelating agents which reduce the bioavailability of micronutrients such as iron and zinc.[1,2] However, a number of processing methods may be employed to eliminate or reduce the level or activity of these factors, including germination, fermentation, soaking, dehulling and thermal treatments (e.g., infrared heating, canning or boiling). Germination (sprouting) is a traditional, non-thermal process which improves the nutritional quality of cereals and pulses by increasing nutrient digestibility, reducing the levels or activities of anti-nutritional compounds, boosting the contents of free amino acids and available carbohydrate, and improving functionality.[3,4,5,6] Germination involves chemical changes such as the hydrolysis of starch, protein and fat by amylolytic, proteolytic and lipolytic enzymes, respectively. When grains and seeds are hydrated (soaked) and then held (sprouted) under ambient conditions, both endogenous and newly synthesized enzymes begin to modify seed constituents.[7] Thus, complex macromolecules are broken down into lower molecular weight molecules which are more digestible and more readily absorbed by the body.[8]

EFFECT OF GERMINATION ON PROTEIN DIGESTIBILITY

Pulses are consumed worldwide and are desired for their high protein quality and quantity. They represent an affordable alternative to animal protein by complementing cereal proteins, thus providing a balanced amino acid profile in vegetarian diets. However, the nutritional benefits of pulse proteins may be limited by anti-nutrients and protease inhibitors which form complexes with proteins and proteolytic enzymes, reducing the bioavailability and digestibility of dietary protein. Germination can reduce the detrimental effect of these anti-nutritional factors and allow the full dietary benefits of cereal and pulse proteins to be realized. *In vitro* protein digestibility was shown to increase in pulses[9] and cereals[10] after germination. The *in vitro* protein digestibility of finger millet improved from 33.9 to 55.4% after 96 h of germination.[10] Improvement in protein digestibility after germination has been attributed to enzymatic hydrolysis and compositional changes following the degradation of constituents such as phytic acid, polyphenols and protease inhibitors.[9,10,11] The availability of crude protein and essential amino acids increases substantially during germination.[12] Increases of up to 21% and 52-76% of total protein and essential amino acids, respectively, were found in soybean and mung bean. The advantage of germination is that it is a simple technique and a traditional method common in many households.

EFFECT OF GERMINATION ON CARBOHYDRATE

Germination induces biochemical changes in carbohydrate that reduce energy values compared to raw and roasted samples, as demonstrated in germinated wheat flour by Kavitha and Parimalavalli.[13,14] Germination triggers enzymatic activity in sprouting seeds, leading to the breakdown of carbohydrates into simpler forms.[15] Studies in a variety of cereals revealed that hydrolytic enzymes are activated during germination which results in degradation of starch and non-starch polysaccharides and an increase in reducing sugars, along with the release of insoluble phenolic compounds covalently bound to cell wall polysaccharides.[16] The combined activity of α- and β-amylases, debranching enzyme and α-glucosidase is responsible for starch breakdown. However, the rate and pattern of enzymatic hydrolysis of starch are dependent on its structure. For example, Chu et al.[17] showed that starch degradation differed between two barley genotypes varying in amylopectin branching. Starch content was reduced faster during germination in the genotype having shorter amylopectin chains, probably because of the lower susceptibility of longer chains to hydrolytic enzymes. The resulting sugars and short chain carbohydrates are ideal for weaning foods as viscosity and digestibility increase along with nutrient absorption.



EFFECT OF GERMINATION ON VITAMINS AND MINERALS

The biochemical processes occurring during germination can generate bioactive components such as riboflavin, thiamine, biotin, pantothenic acid, niacin, vitamin C, tocopherols and phenolic compounds, and also increase their availability.[18] Gilay and Field[19] reported a 1.8- fold increase in the thiamine, riboflavin and niacin contents of sprouted corn grain. Additionally, due to the increased content of free amino acids and reducing sugars, sprouting of cereals such as wheat can potentially promote the Maillard reaction.[20] Moreover, germination has been shown to enhance the bioavailability of minerals such as iron and zinc in cereals and pulses.[21] With longer germination times, the hydrochloric acid extractability of calcium, iron and zinc in pearl millet increased by 2-16%, 15-45% and 12-25%, respectively.[22] Minerals can also leach out into the soak water during the germination process.[23]

EFFECT OF GERMINATION ON FUNCTIONAL PROPERTIES

The germination process may improve the functionality of cereals and pulses. Amongst the functional properties, solubility is often considered the most critical because it affects other properties such as emulsification, foaming and gelation.[24] The breakdown of high molecular weight polymers during germination leads to the generation of bio-functional substances and an improvement in organoleptic qualities due to a softening of texture and an increase in the flavour of various cereals.[25] Elkhalifa and Bernhardt[26] reported an increase in the water absorption capacity of sorghum flour after germination, which could be attributed to an increase in protein quality (e.g., partial unraveling of the protein structure via enzymatic action) upon germination and also the breakdown of polysaccharide molecules. In addition, significant increases were observed in the oil absorption capacity, emulsion activity and emulsion stability of sorghum flour, by 19%, 33% and 21% after three days of germination, respectively. This might be due to the dissociation and partial unfolding of polypeptides that expose the hydrophobic sites of amino acids, which aids hydrophobic association of the peptide chains with lipid droplets.

EFFECT OF GERMINATION ON ANTI-NUTRITIONAL PROPERTIES

Germination plays a significant role in the reduction of anti-nutritional factors, including phenolic compounds, phytic acid, trypsin inhibitors and oligosaccharides.[27] Most of the anti-nutrients bind to protein and/or form complexes with enzymes, rendering them unavailable or inactive for digestion. Unlike protease inhibitors, galactose oligosaccharides (raffinose, stachyose, verbascose, etc.) found in pulses are at least partly responsible for flatulence in humans, which may affect the utilization and acceptance of pulses and pulse ingredients, hence the need to reduce the levels of these compounds. The mechanisms of anti-nutrient reduction during germination vary. Tannins are presumed to leach into the germination medium[28,29] or to undergo degradation.[30] In pulses, soaking and germination for 48 hours was found to reduce the tannin content of chickpea and pigeon pea by 60%, and by 50% in black gram and green gram.[30] Dilute solutions of sodium hydroxide have been shown to be effective in inactivating sorghum tannins during soaking,[31] otherwise tannins

would bind to proteins reducing their digestibility and the enzyme activity required for other cellular functions such as proteolytic and amylolytic activity. The increased activity of polyphenol oxidase and other catabolic enzymes is responsible for reducing the levels of total free phenolic acids.[28] Endogenous phytase breaks down phytates, liberating inorganic phosphate.[27] Phytate reduction of 96% was reported in kidney bean after germination for four days. Since phytic acid is one of the factors responsible for reduced mineral bioavailability, its reduction during germination would enhance the available mineral content in pulses. Studies also have shown that the content of oligosaccharides in pulses decreases substantially during germination, to undetectable levels after 48 hours.[29] The action of endogenous α-galactosidase selectively cleaves galactose from raffinose, stachyose and verbascose, releasing sucrose which is easily broken down in the digestive tract to simple sugars (fructose and glucose) that are absorbed and utilized by the body. In another instance, germination was shown to have a positive effect on the presence of saponins in soybeans, which can be classified as soyasapogenol A- or B-type. Soyasapogenol A has been associated with undesirable bitter and astringent tastes in foods, whereas B-type has been linked to a number of health promoting benefits. Rupasinghe and co-workers reported that germination of soybean led to increased levels of soyasapogenol B, but had no effect on soyasapogenol A levels.[32]

SUMMARY

Germination is an effective processing method for improving nutritional quality, reducing anti-nutritive compounds, boosting the level and digestibility of free amino acids and available carbohydrates, increasing mineral bio-availability, and improving the functional properties of cereal and pulses. Due to the significant effects of germination, sprouted grains and pulses have become popular and widely accepted as functional foods and functional food ingredients.

References

[1] Nout, M. J. R. (1993) Int J Food Sci Nutr 43:213.
[2] Mouquet, R. C. et al. (2008) Int J Food Sci Nutr 59:716.
[3] Ribout, M. (2002) Carbohydr Polym 50:123
[4] Vidal-Valverde, C. et al. (2002) Eur Food Res and Technol. 215:472.
[5] Zanabaria, E. R. et al. (2006) J Sci Food Agric 86:1391.
[6] Frias, J. et al. (2002) Pol J Food Nutr 11:39.
[7] Katina, K. et al. (2007) J Cereal Sci 46:348.
[8] Dhaliwal, Y. S. & Aggarwal, R. A. K. (1999) J Food Sci Techno 36:26.
[9] Chitra, O. et al. (1996) Plant Food Hum Nutr 49:307.
[10] Mbithi-Mwikya, S. et al. (2000) Lebensm-Wiss. u.Technol. 33:9.
[11] Bau, H, et al. (1997) J Sci. Food Agric 73:1
[12] Lee, C. K. & Karunanithy, R. (1990) J Sci Food Agric 51:437.
[13] Kavitha, S. & Parimalavalli R. (2014) J Hum Nutr Food Sci 2:1051.
[14] Rumiyati, J. A. P & Jayasena V. (2012) Food and Nutr Sci 3:621.
[15] Nout, M. J. R. & Ngoddy, P. O. (1997) Food Control 8:279.
[16] Hung, P. V. et al. (2012) J Sci Food Agric 92:667.
[17] Chu, S. et al. (2014) Cereal Chem 91:431.
[18] Moongngarm, A. & Saetung, N. (2010) Food Chem 122:782.
[19] Gilay, M. M. & Field, M. L. (1981) J Food Sci 46:835
[20] Abderrahim, F. et al (2012) J Cereal Sci 56:410.
[21] Luo, Y. W. et al. (2009) J Sci Food Agric 89:861.
[22] Badau, M. H. et al. (2005) Food Chem 92:425.
[23] Tatsadjieu, N. L. (2004) The Journal of Food Technology in Africa 9:17.
[24] Kinsella, J. E. (1976) Crit Rev Food Sci Nutr 7:219.
[25] Subba, Rao, M. V. S. S. T. & Muralikrishna, G. (2002) J Agric Food Chem 50:889.
[26] Elkhalifa, A. O. & Bernhardt, R. (2010) 121:387.
[27] Shimelis, E. A. & Rakshit, S. K. (2007) Food Chem 103:161.
[28] Veerabhadrappa, P. S. et al. (1978) J Sci Food Agric 29:353.
[29] Sharma, A. & Sehgal, S. (1992) Plant Food Hum Nutr 42:127.
[30] Rao, P. U. & Deosthaley, G. (1982) J Sci Food Agric 33:1013.
[31] Beta, T. et al. (2000) J Cereal Sci 31:295.
[32] Rupasinghe V. H. P. et al. (2003) J Agric Food Chem 51:5888.

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Is food a sophisticated ordered tool to deliver nutrients?

Sylvie L. Turgeon* | Laurie-Eve Rioux

The older reader will probably remember the popular *"I am Joe"* article series from the Reader's Digest dedicated to overviewing the human body's function. One article was specifically dedicated to human stomach function *(I am Joe's stomach)*. More recently, the *"dummies"* series has devoted articles to the digestive system with topics highlighting food digestion. From back to the future, the understanding of food digestion will always be an important matter to consumers.

For a long time, the food we eat was considered as a sum of nutrients independently of the nature of the food. The nutritional facts table found on each packaged food product is a good example of this phenomena. Nutrients are presented as percentage daily value to consumers independently of the nature/structure of the product. The subsequent question arising is: Are foods containing the same nutrients all equal? Intuitively, we know some foods are more filling than others although their nutrition facts tables are similar. Therefore, the structure of the food, referred to as the food matrix, may be important. Recently, this topic has gained attraction in the scientific community and it is now emphasized that the composition of food, as well as its final structure will influence the way its nutrients are digested, released and absorbed.[1,2] To exert a nutritional effect in humans, nutrients need to be released from the food matrix (bioaccessibility), transported through the epithelial membrane of the intestine (bioavailability) and metabolized by the targeted organs.[3] This review aims to present through simple examples how the food matrix structure may impact their nutritional properties.

ABC'S OF THE FOOD DIGESTION PROCESS

Let's first focus on what happens when food enters the mouth (Table 1). The structure (liquid, semi-solid or solid) impacts how the food is processed within the mouth. Liquid food is directed towards the mouth cavity and swallowed, while semi-solid food (e.g., yogurt) forms a bolus through the action of the tongue and is then swallowed. For solid foods the bolus is formed while chewing (hydrating and softening the food) and when the particles are small enough, the bolus is swallowed. The bolus formation also involves the secretion of saliva which acts as a lubricant to allow a safe deglutition and contains amylase which will begin to hydrolyse starch. After swallowing, the bolus is submitted to the peristaltic movements of the oesophagus and then delivered to the stomach. The food bolus is dispersed in the gastric juice containing a mixture of enzymes and acid to initiate protein and lipid hydrolysis to obtain the chyme. Mixing is realized through powerful stomach contraction to disintegrate food particles. When the chyme's particles are smaller than 1-2 mm[4], they can flow through the pylorus into the duodenum to carry on the hydrolysis of proteins and lipids, while the large ones are retained in the stomach. Free nutrients are absorbed by the intestinal epithelia while the undigested ones continue to the gut where the microflora may complete their breakdown (readers are referred to recent reviews for more details on the influence of food on the gut microbiota[5,6]).

THE FOOD MATRIX INFLUENCES THE DIGESTION RATE

As seen previously, gastric emptying controls when nutrients and small food particles can enter the duodenum and therefore may be a limiting step delaying nutrients bioavailability. Every food, natural or processed, have their constituents organized into a unique structure. Therefore, the food matrix structure may modulate the kinetics of nutrients release and absorption. Many factors may influence the food matrix digestion such as food microstructure and texture (liquid vs. solid), food constituents (protein sources, fibres, etc.), and processing treatment applied during food manufacture.

WHY IS THE KINETICS OF NUTRIENTS RELEASE IMPORTANT?

Food consumption regulates several metabolic functions. The well-known glycemic index introduced by Jenkins in 1981[10] is a relevant example. White and whole grain breads have respectively a glycemic index of 71 and 51. After ingestion, those two breads induce a different rise in blood glucose. High glycemic food results in a rapid rise in blood sugar which is beneficial in sports nutrition. However, low glycemic food with a slow appearance rate of blood sugar is associated with many positive health benefits[11]. The same concept of modulated amino acids appearance in the blood stream and some specific physiological effects was recently proposed with proteins and two examples will be presented next.

Eat less but feel full - a satiety concept

According to a 2011 report, one-quarter of Canadian adults are obese[12] leading to important health consequences such as diabetes, hypertension, stroke, cancers, etc. This is mostly attributed to food overconsumption altering the energy balance. One approach proposed to improve weight management is through satiety, which refers to the processes that inhibit further eating during a meal (postprandial period). It is the state when you feel full. Several nutrients found in food have the potential to affect satiety. Proteins and fibres are good examples.[13] Some dietary fibres are not metabolized in the gastrointestinal (GI) tract but absorb large amounts of water that may result in an increase in the chyme (digesta) viscosity affecting stomach distension and triggering the fullness signal.[14] Also, when they reach the small intestine they can interfere in the nutrients-intestinal wall interaction delaying the release of satiating hormones. Some authors have also suggested that high viscous fibres included in a beverage may alter glucose absorption in the intestine resulting in decreased glycemic, insulinemic and appetite responses.[15] Proteins may also affect satiety by slowing gastric emptying or stimulating the synthesis of GI hormones.[16-19] For example, whey proteins elicit an higher satiating effect than casein[17] attributed to the different digestion kinetics exerted by these two proteins[20]. Whey proteins (beta-lactoglobulin) transition through the stomach quickly and were shown to be resistant to pepsin activity[18,21]; their hydrolysis begins in the upper part of the intestine. In contrast, micellar caseins coagulate in the stomach due to an acidic pH allowing pepsin to hydrolyse these proteins before their arrival in the intestine. In the literature, these two proteins are often referred to as fast (whey proteins) and slow (caseins) proteins since the rate of appearance of plasma leucine differs[20].

The complexity of the meal modulated by the macronutrients present and food form (liquid vs. solid), will also influence its resulting satiety. Organized food structure like solid foods, elicits higher satiety than beverages in most studies.[22-24] Also, a yogurt formulation containing a higher proportion of whey proteins led to a lower food intake at the next meal when consumed as a snack compared to the control yogurt.[25] Even if both yogurts had equivalent proteins and calories the higher proportion of whey proteins did change their aggregation pattern which may affect digestion kinetics.

Table 1: Main actions occurring during food digestion.[4,7-9]

Digestive Step	Mechanical action	Enzymatic/ biochemcial conditions	Effect on nutrients
Mouth and oesophagus	Mechanical breakage Bolus formation by the teeth and the tongue	Near neutral pH Mucin Enzymes secretion: - Amylase - Lipase	Starch digestion Lipid emulsification and flocculation
Stomach	The stomach mixes and sieves the chyme. The chyme is pumped to the intestinal compartment depending on food viscosity and particle size (< 2 mm)	pH 1-3 Ionic strength 100mM Acid secretion Enzymes secretion: - Pepsin - Lipase	Nutrients solubilisation Protein hydrolysis Lipid emulsification and hydrolysis
Small intestine	Peristaltic movement	pH 6-7 Bile acids Enzymes secretion : - Trypsin, - Chymotrypsin - Carboxypeptidase - Aminopepdidase - Elastase - Collagenase - Lipase - Amylase - Glucosidase	Nutrients release and absorption Peptide, amino acids Fatty acids Monosaccharides
Gut	Longitudinal contractions	Microbiota fermentation	Liquid and nutrients absorption

Muscle mass synthesis – the bodybuilder paradigm

In humans, there is a balance between muscle protein synthesis and muscle protein breakdown responsible for the net muscle growth. This is dependent on the food protein consumption and the resulting rise in blood amino acid (aminoacidemia). As we age our muscle mass and strength decline impairing our physical performance. This is a geriatric condition named sarcopenia. Physical activity and the dietary protein consumption may attenuate this condition (recently reviewed by Churchward-Venne, Breen[26]). However, a large body of evidence suggests that dietary proteins are not all equal in terms of muscle protein synthesis after exercise. For example, the whole body protein gain of elderly men fed a whey protein enriched meal was higher than when fed a casein enriched meal[27]. Different digestion kinetics may be relevant to support muscle, whey proteins being easily digested (fast protein) and consequently easily utilized.

Natural food structure vs processed foods

The natural and complex organization of plant based foods is a good example of how nutrients organization modulates nutrients release. The benefits of whole grain in cereal based products is of common knowledge.[28] During food manufacture, the ingredients are cooked, fried, roasted, homogenized, extruded, mixed, frozen, milled, baked, etc. Some of these processes are also common culinary steps. Those processes may influence food structure. The main purpose is to improve food palatabil-

ity and shelf life but it may impact their nutritional properties. Almond's lipids (50-55%) are located within the seeds cell-wall. Mastication only frees part of the lipids resulting in a low lipid release (8-11%)[29] and blood lipid appearance.[30] Therefore, cells must be fractured by mechanical processing to increase lipid bioaccessibility.[31] Also, raw almonds were emptied rapidly from the stomach[32] and significantly lower amounts of lipids were released[29] compared to roasted almonds. Increasing nuts lipid bioaccessibility may increase the absorption of vitamin E, a fat-soluble antioxidant. Almond's vitamin E has reduced blood oxidized LDL[33], a marker involved in cardiovascular diseases[34]. The better bioavailability of lycopene from cooked tomatoes is another example of the benefit of some processing on nutritional attributes[35]. Similarly, cooking carrots improves carotenoids bioaccessibility and bioavailability. For example, carotenoids are often embedded within the cell wall or attached at the cell surface in fruits and vegetables altering their bioaccessibility and bioavailability.[36, 37]

Dairy products: food with many attributes

Dairy products represent interesting examples of digestion behaviour varying with food structure. The microstructure (liquid vs. solid) and the texture of food may influence the gastric transit time and consequently the nutrients bioaccessibility (amino and fatty acids). A recent animal study showed that minipigs fed milk or yogurt having the same composition led to different absorption kinetics of dietary proteins[38] and rate of appearance of plasma leucine[39]. Liquid food was promptly emptied from the stomach after ingestion while viscous food was retained longer. Furthermore, yogurt-like gels and rennet like-gel (mimicking soft cheese) had different[40] rate of plasma leucine appearance, the former showing a delay. It was hypothesized that gastric emptying was delayed due to contraction of the gel in the stomach acidic environment. Thus, food that looks the same may have different kinetics of protein digestion.

THE TAKE HOME MESSAGE

We have given examples of the crucial role of the stomach/duodenum and its complex relationship with food during its digestion. Each step of the digestion path has an equally important role in breaking down the food structure to free and process the nutrients for our bodies benefit. Designing food structure to deliver nutrients in an optimized way is an important topic for functional food development. But we still have a lot to learn on how the food structure impacts several physiological responses because we eat food and not nutrients. Food is a complicated combination of macronutrients having distinctive structures associated with a specific bioaccessibility and bioavailability. Food items are rarely consumed individually but are mostly included in a meal. Their interaction has been poorly investigated which can bring us "to infinity… and beyond*"…

References

[1] Argov, N. et al. (2008). Trends in Food Science & Technology, 19: 617.
[2] Turgeon, S.L. & Rioux, L.-E. (2011). Food Hydrocolloids, 25: 1915.
[3] Versantvoort, C.H.M. et al. (2005). Food and Chemical Toxicology, 43: 31.
[4] Kong, F. & Singh, R.P. (2008). Journal of Food Science, 73: R67.
[5] Conlon, M.A. & Bird, A.R. (2015). Nutrients, 7: 17.
[6] Scott, K.P. et al. (2013). Pharmacological Research, 69: 52.
[7] Lentle, R.G. & Janssen, P.W.M. (2008). Journal of Comparative Physiology B-Biochemical Systemic and Environmental Physiology, 178: 673.
[8] Klein, S. et al., Alimentary tract in nutrition, in Modern nutrition in health and diseases, M.E. Shils et al., Editors. 2006, Lippincott Williams & Wilkins: Baltimore, USA. p. 1115.
[9] Keller, J. & Layer, P. (2005). Gut, 54: 1.
[10] Jenkins, D.J.A. et al. (1981). American Journal of Clinical Nutrition, 34: 362.
[11] Jenkins, D.J.A. et al. (2002). American Journal of Clinical Nutrition, 76: 266S.
[12] PHAC/CIHI, Obesity in Canada: A joint report from the Public Health Agency of Canada and the Canadian Institute for Health Information. 2011. p. 54.
[13] Fiszman, S. & Varela, P. (2013). Trends in Food Science & Technology, 32: 43.
[14] Kristensen, M. & Jensen, M.G. (2011). Appetite, 56: 65.
[15] El Khoury, D. et al. (2014). European Journal of Clinical Nutrition, 68: 613.
[16] Bowen, J. et al. (2006). Journal of Clinical Endocrinology and Metabolism, 91: 2913.
[17] Hall, W.L. et al. (2003). British Journal of Nutrition, 89: 239.
[18] Mahe, S. et al. (1991). American Journal of Clinical Nutrition, 54: 534.
[19] Mahé, S. et al. (1996). American Journal of Clinical Nutrition, 63: 546.
[20] Boirie, Y. et al. (1997). Proceedings of the National Academy of Sciences of the United States of America, 94: 14930.
[21] Boirie, Y. (2004). Nutrition Clinique et Métabolisme, 18: 25.
[22] Leidy, H.J. et al. (2010). Obesity, 18: 293.
[23] Juvonen, K.R. et al. (2011). British Journal of Nutrition, 106: 1.
[24] Hogenkamp, P.S. et al. (2011). Appetite, 57: 635.
[25] Doyon, C.Y. et al. (2015). Applied Physiology, Nutrition, and Metabolism, 40: 980.
[26] Churchward-Venne, T.A. et al. (2014). Biofactors, 40: 199.
[27] Dangin, M. et al. (2003). Journal of Physiology, 549: 635.
[28] Health Canada Whole Grains - Get The Facts. 2015.
[29] Grundy, M.M.L. et al. (2015). American Journal of Clinical Nutrition, 101: 25.
[30] Berry, S.E. et al. (2008). American Journal of Clinical Nutrition, 88: 922.
[31] Mandalari, G. et al. (2008). Journal of Agricultural and Food Chemistry, 56: 3409.
[32] Bornhorst, G.M. et al. (2013). Journal of Food Science, 78: H1807.
[33] Jenkins, D.J.A. et al. (2002). Circulation, 106: 1327.
[34] Yoshida, H. & Kisugi, R. (2010). Clinica Chimica Acta, 411: 1875.
[35] Stahl, W. & Sies, H. (1992). Journal of Nutrition, 122: 2161.
[36] Lemmens, L. et al. (2009). Food Research International, 42: 1323.
[37] Schweiggert, R.M. et al. (2014). British Journal of Nutrition, 111: 490.
[38] Gaudichon, C. et al. (1994). Journal of Nutrition, 124: 1970.
[39] Barbé, F. et al. (2013). Food Chemistry, 136: 1203.
[40] Barbé, F. et al. (2014). Food Chemistry, 143: 1.

*From Toy Story movie, 1995.

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Positioning High-Quality Plant-Based Protein Sources For The Food Industry: Do We Need To Adopt New Approaches?

James D. House[1,2,3,4] | Matthew Nosworthy[1]

Consumers continue to demand products that feature protein claims on front of the package, with protein featured as one of the top 10 key trends in food, nutrition and health for 2015.[1] Factors driving increased interest in protein include perceptions by consumers of the linkage between protein consumption and increased satiety (feeling of fullness), sustained energy, and maintenance of a healthy immune system. During food product formulation, the nature of any protein is a critical decision point, particularly when balancing issues such as allergens (i.e. milk, soy, wheat) and perceptions regarding healthfulness and sustainability of production practices. Plant-based protein sources can allow the food industry to capture the protein trend, however foods need to meet the regulatory requirements necessary to qualify for a protein content claim. In Canada, the Protein Rating[2] system is used which is based on a rodent growth bioassay to determine the Protein Efficiency Ratio (PER) of a given protein source. Protein ratings between 20 and 40 qualify foods for a "Source of Protein" claim, while ratings above 40 qualify for "Excellent Source of Protein" claims. This method, while simple, has severe limitations including the fact that the results derived from individual protein sources cannot be used to calculate a protein rating for blends of different proteins, in any meaningful way. In the United States, source claims are based on the Protein Digestibility-Corrected Amino Acid Score method, or PDCAAS[3], a method that does permit calculation of values for protein blends. This method yields a value derived as the product of: a) an estimate of the digestibility of the protein, determined using a rodent bioassay; and b) the amino acid score, a value calculated from the amino acid composition of the protein source when compared against human amino acid requirement estimates.

For both the Protein Rating and the PDCAAS methods, the use of a rodent bioassay is required. A new method, called the Digestible Indispensable Amino Acid Score or DIAAS, has been positioned as an alternative assessment method for establishing protein quality estimates[4]. However, the DIAAS method also relies on the use of an animal bioassay, in this case a surgically-modified swine model, complete with a cannula inserted through the abdominal wall of the animal into the terminal end of the small intestine. While theoretically a refinement of the PDCAAS method, to date, no convincing evidence exists to substantiate that protein nutrition of the human population would be substantially enhanced by moving to the DIAAS method. It is important to note that, from a regulatory perspective, protein is the only nutrient that requires the use of an animal model for the establishment of nutrient content claims. Perhaps the time has come to focus on alternative methods to measure protein quality in support of protein content claims. This is particularly important for those companies within the food sector that have policies in place to prohibit the use of bioassays. Any positioned alternative should be: a) sufficiently robust to ensure that any risks to human health are minimized; b) flexible to permit the determination of the quality of novel protein blends; c) widely available and accessible to permit innovation via the food industry; and d) validated against an existing, approved methodology. Alternatives exist, but unlike current international efforts to develop consensus around a new *in vivo* approach[4], the same cannot be said for *in vitro* approaches.

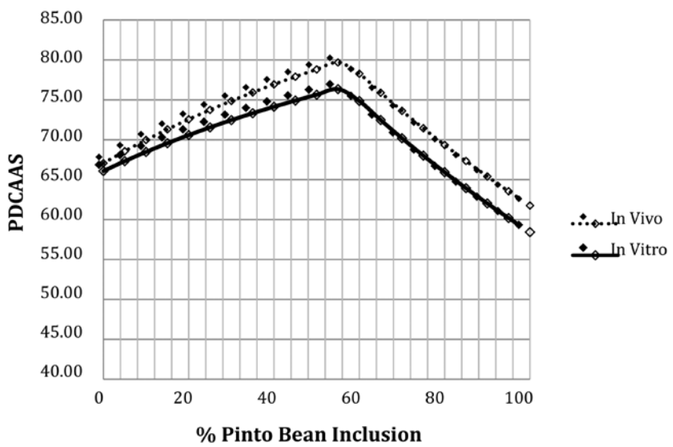
IN VITRO MEASUREMENTS OF PROTEIN QUALITY

The simplest approach to expressing the ability of a food product to contribute to human protein needs is the use of

crude protein content. Effectively, this approach is used in those jurisdictions that don't mandate the use of either PER or PDCAAS to reflect the protein quality of foods.[5] Given that current national databases examining nutrient intake in the human population focus primarily on crude protein intake, without adjusting for protein quality, perhaps this approach is sufficient. However, simply maintaining a focus on crude protein (i.e. nitrogen x 6.25) does not necessarily protect consumers from exposure to ingredients that cannot contribute to human protein needs, including severely damaged proteins, ingredients that contain anti-nutritive factors or ingredients that are high in non-protein nitrogen. Shifting the focus to the amino acid composition of the ingredient is a significant advancement and reflects the primary approach used in both the PDCAAS and DIAAS methods. Existing nutrient databases[6] contain the amino acid composition of thousands of food items, and amino acid analysis of novel foods or food ingredients is readily available via commercial laboratories. The amino acid composition data can then be positioned against human amino acid requirement reference patterns to establish the amino acid score. A score of 1.0 or greater would indicate that the food or ingredient is not deficient in any amino acid with respect to its ability to support human amino acid needs. A score less than 1.0 is indicative of a deficiency in one or more of the essential amino acids. The amino acid score (also called chemical score) for defining protein quality could be used instead of the PDCAAS, essentially following the same procedures for correcting the protein content for quality estimates. The obvious limitation in using just the score is the fact that the value does not reflect any factors that may limit the digestibility or availability of the amino acids contained in the protein source. In order to offer a more robust alternative to PDCAAS, the continued use of the amino acid scoring concept coupled with an *in vitro* assessment of protein/amino acid digestibility may fit the bill.

The measurement of *in vitro* protein digestibility can be accomplished through either static or dynamic measurement systems. Static systems reflect methods that seek to measure the release of amino acids from dietary proteins upon exposure to gastric and/or intestinal proteases, under discrete temperature and pH conditions. The measurement of amino acid release can be monitored by measuring individual amino acids, free amino groups, or by changes in pH[7]. These methods have advantages in terms of cost, throughput and ease of implementation, however the static nature of the systems distances them from normal physiological processes. Several methods have been proposed and, to date, consensus has not been reached on a single method. Dynamic systems for measuring protein digestibility involve the use of computer-controlled chambers designed to mimic the human gastrointestinal tract, where pH, temperature, enzyme addition, mixing and residence times are precisely controlled[8]. While the systems tend to model gastric physiology more accurately, sample throughput and cost per analysis make routine use challenging. However, the coupling of *in vitro* protein digestibility with the amino acid score, to yield an *in vitro* PDCAAS, creates the opportunity to move away from conducting animal-based studies for protein quality evaluation. What is needed to advance this concept are studies designed to directly compare *in vivo* and *in vitro* PDCAAS measurements and evidence to support that such a move would not compromise human protein nutrition. Approved or accepted *in vitro* techniques would offer the food industry opportunities to quickly assess new product formulations, while affording the confidence that the values could be used to support regulatory claims. This is particularly true for the plant protein sector, given the variety of new plant protein sources and the strong interest expressed towards the inclusion of plant proteins into food products.

Figure 1: The Impact of Adding Extruded Pinto Bean Flour to Extruded Buckwheat Flour on In Vitro and In Vivo PDCAAS Values



CASE STUDY: PROTEIN QUALITY OF NOVEL PLANT PROTEIN BLENDS

As an example of how in vitro PDCAAS could be used to assist the food industry, a study was conducted to examine the *in vivo* and *in vitro* PDCAAS of two novel plant flours: a) extruded whole buckwheat flour; and b) extruded whole pinto bean flour. The amino acid score of both protein sources was determined (3), and corrected for either *in vivo*[3] or *in vitro*[9] protein digestibility. The data in Figure 1 shows how the PDCAAS values, regardless of how digestibility was determined, can be influenced by blending the two protein sources. The addition of extruded pinto bean flour complements the lower lysine level in the extruded buckwheat flour, while the sulphur amino acid content of buckwheat mitigates the limiting nature of the pinto beans. As depicted in Figure 1, despite a slightly lower overall PDCAAS for the *in vitro* method, the optimal blend estimates were the same (45:55 buckwheat: pinto bean).

A PATH FORWARD

The ability of the food industry to adopt new innovations in supplying plant-based protein sources to consumers is, to a certain extent, limited by current regulations mandating the use of animal data to support protein quality estimates. Positioning alternatives should become a priority for the food industry. However, any new approaches must provide regulatory agencies the confidence that risks to human health have been mitigated.

References
[1] Mellentin, J. (2014). 10 Key trends in food, nutrition and health. New Business Journal. December, 2014. (accessed: https://www.new-nutrition.com/report/showReport/1235)
[2] Health Canada, Health Protection Branch. Official Method F0-1: The determination of protein rating. (accessed 11/15: http://www.hc-sc.gc.ca/fn-an/alt_formats/hpfb-dgpsa/pdf/res-rech/fo-1-eng.pdf)
[3] Joint FAO/WHO (1990). In Joint FAO/WHO expert consultation on protein quality evaluation. Food and Agriculture Organization of the United Nations; Rome, Italy.
[4] FAO Expert Consultation (2013). Dietary protein quality evaluation in human nutrition. Food and Agriculture Organization of the United Nations. Food and Nutrition Paper 92. Rome, Italy.
[5] Lewis, J.L. (2012). Brit. J. Nutr. 108: S212.
[6] Canadian Nutrient File. Online database. (Accessed: http://webprod3.hc-sc.gc.ca/cnf-fce/index-eng.jsp)
[7] Hsu, H.W. et al. (1977). J. Food Sci. 42:1269.
[8] Minekus, M. et al. (1995). ATLA 23:197.
[9] Tinus, T. et al. (2012). J. Food Eng. 113:254.

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PART 4 OF 4

Designing a Clean Label

Sara Zborovski

Welcome to the fourth and final edition of the Regulatory Arena devoted to the Clean Label. It has been a lot of fun so far: we have defined the "clean label", considered its treatment in Canada compared to the United States, and dug into some hot topics in clean labelling.

In this Regulatory Arena, we move off of compliance and onto enforcement. What happens if you get it wrong with your clean label?

In short, you might be hearing from the Canadian Food Inspection Agency (CFIA). The CFIA enforces food-related legislation and enhances and improves compliance through enforcement activities. One of the things on the CFIA's agenda is policing food labels for compliance with, among other things, the *Food and Drugs Act.*

THE PROHIBITION ON FALSE AND MISLEADING LABELS

The Food and Drugs Act prohibits the labeling of food in a manner that is false, misleading or deceptive, or is likely to create an erroneous impression regarding its character, value, quantity, composition, merit or safety. Among other things, this means that industry can't ascribe a benefit to a food that isn't there.

Recall that the clean label trend is all about creating a perception about a food: made using "clean" ingredients, by "clean" processes. A clean label is one that brags to consumers about the "cleanliness" (amazingness) of the product inside.

It is important that industry can support all of the claims (clean or otherwise) made on the labels of food sold in Canada.

In considering whether a label is truthful and not misleading, all aspects of the label are considered, including the name of the product, pictures on the label and that the claims made about the product. We care about the *overall impression* made by the label.

If a label is not an accurate representation of the product inside, technically that label is non-compliant with the regulatory regime for labelling, and subject to enforcement by the CFIA.

A FINDING OF NON-COMPLIANCE AND CFIA ENFORCEMENT

A non-compliant label can be brought to the attention of the CFIA in a number of different ways: through a consumer complaint, by industry self-reporting and by its own spot-audits of grocery store shelves (yes, the CFIA samples and tests products to ensure accuracy in food labelling).

Lucky for the Canadian food industry: the CFIA believes in the importance of communication with regulated parties and in generating compliance. Once a non-compliance has been identified, the CFIA will work with the regulated party to bring the product into compliance.

As set out in the CFIA's *Compliance and Enforcement Operational Policy*, the Agency's approach to compliance and enforcement is as follows:

> *[it] is based on the concept of a compliance and enforcement continuum, which includes providing information on and the assessment of compliance as well as responding to non-compliance. This is done through a wide variety of approaches, including communicating with regulated parties; conducting inspection activities; and taking appropriate enforcement actions in responding to non-compliance.*

In the event of a clean label that is not accurate, the CFIA will determine the appropriate response, based on a fact-specific analysis considering: the severity of the non-compliance; the potential or actual harm to Canadian consumers; the company's history; and the intent behind the non-compliance.

And here it is: it is possible that the CFIA would request a company recall a product that is inappropriately labeled as being too clean.

Recalls can be costly for industry, both in terms of money and time spent on actioning the recall, and in the loss of consumer goodwill associated with the brand that is being recalled. In the case of the clean labelling trend, it could be the hit to the brand that is the most important.

As we have discussed over the year here at the Regulatory Arena, the clean label trend is all about transparency – telling consumers about what is in the product – and using ingredients perceived as beneficial. Thus, a recall of a perceived "clean" product because of an inaccurate (false or misleading) label, could be seen as particularly troubling for consumers keen on the clean label trend.

A FINAL WORD: BE CAREFUL!

And so our final message for industry in connection with the clean label trend is this: tread carefully.

Industry has to balance delivering labels that consumers want on the one hand, with labels that the CFIA wants (i.e. those that are regulatory compliant) on the other. Somewhere in the middle is the sweet-spot for each Canadian food label: the one that draws clean-conscious consumers in, without upsetting our regulator.

GARLIC AFICIONADO PUBLISHES BOOK ON ITS HISTORY

Text by Sorush Khalesi

Garlic enthusiast Peter McClusky is the founder of the Toronto Garlic Festival, as well as a consultant for the Greenbelt Foundation. Most importantly, he is also a garlic farmer. Garlic and its history have greatly impacted McClusky's life, and inspired him to author *Ontario Garlic: The Story from Farm to Festival.*

Garlic has had a very long and interesting history, where it has stood for hate, health, humility, and ultimately, culture. Inspired by garlic's unique story, McClusky brings to light that history. In his book, McClusky describes the journey of garlic in Ontario from a despised herb to a celebrated spice. From the first immigrants who introduced garlic to the province, to the festival and joyous celebrations we have today in honour of it, McClusky tells the story of one of the oldest flavourings in the world.

WHY DOES GARLIC HAVE ITS OWN FESTIVAL AND HISTORY BOOK?

Well, because it deserves it. As I say about garlic at the Toronto Garlic Festival, garlic is the celebrity. Virtually every age, and culture and background of people love garlic and have interesting stories around garlic. It's the flavour and long history that people are celebrating, and that's why they love the Toronto Garlic Festival.

TELL US SOMETHING ABOUT GARLIC WE DON'T KNOW.

I think one thing that people don't seem to know about garlic is that it's susceptible to heat, so when you cook garlic, it tends to destroy that flavour... An interesting fact for people to take away is that if you want garlic for medicinal purposes, for example, then you want a strong garlic; you shouldn't cook it, you just eat it raw and thoroughly crushed.

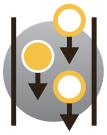
DO YOU LOOK FORWARD TO WRITING ANY MORE BOOKS?

Maybe. Right now, I'm focused on garlic, but who knows what may happen in the future.

ARE YOU A TALENTED COOK?

Yeah, I'm a pretty good cook. I cooked in restaurants years ago. At one point, I thought of becoming a chef, but decided not to, so I pursued other things. But in the meantime, I enjoy cooking every day.

Titration



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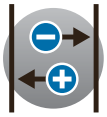

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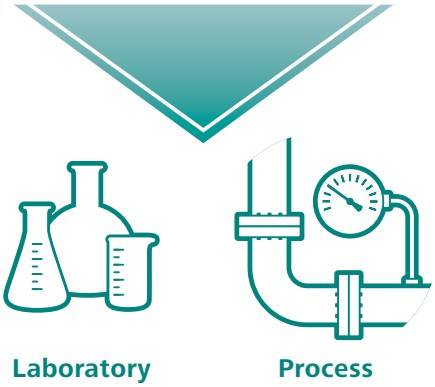

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