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TEXTURE: TASTE THE DIFFERENCE

**New ingredients, strategies
to bridge the texture gap in
plant-based dairy and meat.**



**Explosion! New Protein
Products, Ingredients**

**Consumer Insights:
Ultra-Processed Foods**

**Healthy Aging: Nutrition
for Better Bodies**

**Sweet Life: Chocolate Stars
in new Confections, Products**



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SEPTEMBER 2025

Vol. 194, No. 9

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Masthead

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WHAT'S TRENDING

FOOD SCIENCE—FOR EYES & EARS

Want to listen to industry news and views on the way to work? Catch a quick video on a lunchbreak? *Prepared Foods* now goes anywhere—and everywhere—to cover critical topics.

Better Beverages

PepsiCo's new Pepsi Prebiotic Cola includes 5g of cane sugar, has 30 calories, and contains no artificial sweeteners. It also delivers the added functional ingredient of 3g of prebiotic fiber.

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Java Time

Private label processor Westrock Coffee Company opened a new 525,000-sq.-ft. production facility in Conway, Ark. The new site is equipped to produce millions of single-serve cups daily.

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Tariffs Impact Food Costs, Prices

New US tariffs could certainly impact the cost of food and beverages, argues the National Restaurant Association (NRA). NRA President & CEO Michelle Korsmo said these changes could increase the prices for popular restaurant items such as coffee and hamburgers and raise prices for many other needed menu ingredients.

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Hot Take: New Flavor

The sandwich cracker brand Lance introduced its first new flavor in nearly four years: a limited-edition Lance Nashville Hot. Lance says it features a “punch of creamy cheddar, bold heat and a dill pickle zing” in every bite between Lance’s traditional “Toast Chee” Cheddar crackers.

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New Products



« Celebrating “Summerween”

Mars Incorporated, Newark, N.J., said it was going all in on “Summerween” and introducing its 2025 Halloween candies line-up in late July to retailers. New offerings include M&M’S Milk Chocolate Pumpkin Pie and a M&M’S Halloween Blend, Snickers Pumpkins, Twix and Snickers “Ghoulish Green” candies and Skittles Shriekers.

“Summerween is a movement and Mars is matching that energy—making sure your favorite Halloween products are on shelf whenever you’re ready to celebrate,” said Tim LeBel, Mars chief Halloween officer and president of sales. “We’re inspired by the fans reshaping tradition and we’re ready to celebrate alongside them with more than 90 products in our 2025 Halloween line-up.”



Candy and Cookie

The Hershey Company collaborated with Mondelēz International, Inc. for two crunchy, creamy treats combining the companies’ Reese’s and Oreo brands. One offering is the Reese’s Oreo Cup, which combines milk chocolate and white creme peanut butter cups with Oreo cookie crumbs.

“At REESE’S, we’re obsessed with pushing the boundaries of what chocolate and peanut butter can become — and our fans fuel that fire,” said Dan Mohnshine, vice president, U.S. Confection Marketing, The Hershey Company. “This isn’t just another product launch — it’s two legendary brands coming together to create something absolutely unprecedented that’ll blow minds and taste buds everywhere.”

Sweet Snacking

Mars, Incorporated, Newark, N.J., tapped the nostalgic flavor of peanut butter and jelly sandwiches for its latest product offering: M&M’S PB&J chocolate candies. The company closed July with a lunch special promotion including the candies, a collectible, limited-edition lunch box and a promotion featuring popular TV mom actress, Kim Rhodes.



“Fun is what makes M&M’S such a beloved brand, and sometimes that means taking a trip down memory lane to relive the simpler times that made us all smile,” said Martin Terwilliger, vice president of marketing, Mars Wrigley North America.

M&M’S Peanut Butter & Jelly is available at retailers nationwide and online at MMS.com in Single (1.63oz.), Share (2.83oz.) and Sharing Stand Up Pouch (8.6oz) sizes.



Fashionable Flavor!

After a limited-edition launch last year, Lindt & Sprüngli (USA) came back this July with its Lindt Dubai Chocolate Bar. The offering combines Lindt milk chocolate with a filling made from pistachio paste containing 45% pistachios, crunchy kadayif, almonds and hazelnuts. Bars are available at Walmart, Target, Walgreens, Kroger, Albertson’s, Meijer, Publix, Stop & Shop, Hannaford, Hy-Vee and other retailers.

“After our handmade limited-edition bars sold out in a matter of days in December 2024, it was our mission to create a refined recipe using state-of-the-art technology,” said Ann Czaja, Lindt master chocolatier. “We keep a close eye on flavor trends and are proud to invite consumers across America to taste our newest luxurious creation!”



Mindful Sweet Treat

Hormel Foods Corp. extended its Justin’s spreads and snacks brand with Peanut Caramel Nougat Chocolate Candy Bars in two varieties: Dark Chocolate and Milk Chocolate. Both are offered in a 1.4oz single-serve format with an MSRP of \$2.49-\$2.79, and 4.2oz multi-serve pouches containing six individually-wrapped, mini-size bars with an MSRP of \$6.79-\$7.49. The candy bars debuted this summer at Sprouts Farmers Market, with additional retailers following throughout the year, including Whole Foods Market in August.

“As consumer demand for simple ingredient treats grows, we’re delighted to provide both new and loyal fans alike with a new way to enjoy Justin’s organic chocolate treats in nostalgic and beloved formats,” said Jenny Burns, senior director of brand equity at Justin’s. “We’ve seen strong retailer interest for the candy bars from our long-time retail partners like Sprouts and Whole Foods, and are looking forward to partnering with them and others to offer shoppers another permissible indulgence they’ve been craving.”

Nostalgic Flavor

Mars Inc., Newark N.J., extended its popular TWIX line with new nostalgic flavor: snickerdoodle cookie. TWIX Snickerdoodle offers crunchy cookie, gooey caramel and smooth milk chocolate along with a cinnamon-sugar swirl of snickerdoodle-flavored caramel, the company says. TWIX Snickerdoodle hit shelves nationwide in July in Single (1.4oz) and Share (2.8oz) sizes.



“Because TWIX is the iconic brand of two, we’re always looking for ways to double down on flavor,” said Martin Terwilliger, marketing vice president, Mars Wrigley North America. “TWIX Snickerdoodle gives fans a new twist on the layers they already love. It’s the perfect balance of familiar and trendy flavors, and we know it’s going to be a fan favorite.”



Chocolate—Plus

The Hershey Company, Hershey, Pa., greeted summer with a new, limited-time Hershey’s Milk Chocolate with Caramel bar with a caramel center.

“The combination of our signature milk chocolate with golden caramel transforms the classic Hershey’s bar into something extraordinary — it’s tradition reimaged with just the right touch of indulgence,” said Kyles Webster, senior associate brand manager, at The Hershey Company. “We’re delighting s’mores lovers everywhere with a delicious twist to nights by the campfire and the addition of melty caramel to HERSEY’S Milk Chocolate.”

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New Products



Protein—Plus

The Hershey Company's ONE Brands protein bar business partnered with Hershey's chocolate for a ONE x Hershey's Double Chocolate bar with 18g of protein and 1g of sugar. It includes real Hershey's cocoa and chocolate chips.

"The ONE x Hershey's Double Chocolate flavored protein bar isn't just another convenient and nutritious snack—it unlocks a sweet, satisfying and unforgettable flavor experience that only ONE can offer," said Deanna Lyons, brand manager at ONE Brands.



Lovely Day for Ice Cream

Van Leeuwen Ice Cream LLC, Brooklyn, N.Y., partnered with global alcoholic beverage maker Diageo for a co-branded line with Guinness beer. Inspired by the classic "Lovely Day for a Guinness" ads of the 1950s, the limited-edition ice cream pays homage to that same legacy. Pint cartons say the offering is Guinness flavored ice cream with chocolate chunks.

"At Van Leeuwen, we're all about making good ice cream that makes you feel good – and what better way to do that than with Guinness?" said Ben Van Leeuwen, CEO and co-founder. "Their bold, smooth flavor is a perfect match for our rich French-style ice cream, and this collab felt like the kind of lovely-day indulgence that summer calls for."



Sweet Duo

The Hershey Company partnered with Mondelez International, Inc. to put two big brands together with the Oreo Reese's Cookie. Each cookie features signature Oreo chocolate sandwich cookies filled with a Reese's peanut buttery creme with Oreo cookie crumbs. Oreo Reese's Cookies were available nationwide starting September 2025, while supplies last, and will return to shelves as part of the OREO brand's portfolio in January 2026.

"At OREO, we're always striving to break into the cultural conversation with unexpected and delicious partnerships for fans," said Michelle Deignan, vice president, the Oreo brand, US. "As a 110+ year-old brand, we're constantly looking for ways to disrupt the snacking market."



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Frozen Fun

Rich Products Corp., Buffalo, N.Y., extended its Farm Rich brand with three frozen snacks suitable for microwave, air fryer or oven. Included are new Chocolate Brownie Bites that have a fudgy brownie bite center and chocolate crumb coating.

"Our latest innovations deliver everything we love in a snack: bold flavors, convenience and real ingredients," said Kelly Rabinowitz, director of marketing, Frozen Retail Brands at Rich Products. "Whether you're craving heat, comfort or looking to satisfy a chocolate sweet tooth, we have summer snacking covered for the whole family."



Celebrating Stranger Things

Mondelez International, Inc., East Hanover, N.J., created a special CHIPS AHOY! x Stranger Things Limited-Edition Cookie is "inspired by the Upside Down, a dark alternate dimension that has played a key role throughout every season of Stranger Things." The cookies feature a new CHIPS AHOY! chocolatey base, fudge chips and a red strawberry-flavored filling.

Beginning on August 11, fans could find the CHIPS AHOY! x Stranger Things Limited-Edition Cookie at retailers nationwide, starting at \$5.79. In addition to the traditional tray, the cookies also are available in two-count portion packs. This fall, the award-winning series returns with its fifth and final season. Stranger Things 5 will release on Netflix across three premiere dates with four episodes on November 26.

Fun with Flavor

Jeni's Splendid Ice Creams, Columbus, Ohio, greeted summer with a range of new offerings. It partnered with artist CJ Hendry in mid-August for a provocative exploration of color and flavor in a New York City pop-up ice cream shop experience. Its limited edition OPAQUE was a jet black ice cream made with black cocoa, espresso fudge, and balsamic cherry.

Jeni's also celebrated national ice cream month (June) with a new "Super Fun Times" summer collection with as many as six new offerings. Included was a Toasted S'mores variety with "toasty vanilla bean marshmallow ice cream with gooey milk chocolate and graham cracker cookies."



Better Bars

Nature's Bakery, Pasadena, Calif. (Mars Incorporated), extended its namesake brand with Hearty Bars soft-baked bars that are vegan, nut-free, and "thoughtfully made to support a balanced, on-the-go lifestyle," the company says. They come in Blueberry and Chocolate Chip varieties with whole grains, real fruit, Rainforest Alliance Certified™ cocoa, 9g of plant-based protein from fava bean and sunflower sources.

"With Hearty Bars, we aimed to create a delicious, soft-baked snack made with plant-powered protein that's suitable for all ages and stages," said Pilar Arellano, senior vice president of marketing at Nature's Bakery. "Our oven-baked recipe combines ingredients like fava bean and sunflower protein paired with delicious chocolate chips and real blueberries, so we've crafted a bar that delivers on texture, taste and thoughtful ingredients which sets us apart in this space."

Small Size, Big Flavor

Sindoni North America, Miami, used the 2025 Summer Fancy Food Show to introduce Pirucream Bites with the crunchy texture of a thin rolled wafer around a smooth, creamy center. They come in three flavors: Chocolate Hazelnut, Double Chocolate, and Coconut Crème.

"Pirucream Bites represent an exciting evolution for our brand," said Jonathan Sanchez, CEO of Sindoni North America. "We've taken our delicious heritage recipe and adapted it for today's lifestyle, with the same quality of everyday indulgence. With this new line, we're opening the door to entirely new retail conversations across the U.S."



Mini Pie, Max Flavor

Sara Lee Bakery, Oak Brook, Ill., introduced Cyrus O'Leary's Mini Cream Pies in six flavors for foodservice and convenience store operators. The 4-inch, single-serve pies come with graham crust. Varieties include Banana Cream, Strawberry Cream, Coconut Cream, Lemon Cream, Chocolate Cream, Coconut Cream and Tiramisu Cream.

"Foodservice and convenience store operators can boost sales by offering small, satisfying, grab-and-go treats," said Ryan Morris, senior brand manager of foodservice at Sara Lee Bakery. "Whether rewarding themselves after a long day or taking a moment to relish in something sweet, consumers will appreciate the perfectly portioned indulgence of Cyrus O'Leary Mini Cream Pies."



Campfire Collection

Unilever United States Inc., Englewood Cliffs, N.J., partnered with The Hershey Company for a three-item Breyers Campfire Collection of S'mores treats featuring marshmallow, Hershey's milk chocolate and crunchy graham cracker. Offerings include ice cream in a 48oz Tub as well as pints. There's also a S'mores Bar and a S'mores Sandwich.

"Many people assume that the marshmallow-roasting of the s'mores can only be found accessible to a firepit. Breyers found a way to take the most beloved part of roasting — the s'mores — and make it accessible to a firepit, anywhere," said Bentley King, US Head of Ice Cream Marketing Operations at Unilever.

It's a Big Deal

General Mills, Minneapolis, extended its Pillsbury line with BIG COOKIES Cookie Dough, described as "more than three times the size of Pillsbury's classic cookie." Three flavors include S'mores, Chocolate Chunk Salted Caramel, and Double Chocolate Cherry. They debuted at Walmart in May and rolled out to retailers nationwide for a MSRP of \$5.99.

"Larger, bakery-style cookies are trending right now, so we knew it was time to bring those big flavors home," said Michelle Odland, business unit director for Pillsbury. "Perfect for anytime indulgence, Pillsbury BIG COOKIES help you fulfill a craving within minutes."



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Ultra-Processed = Ultra Problem?

Innova finds only one-third of consumers limit “demonized” bad-for-you ingredients.

Credit: photobac / Getty Images


Demonization doesn't have to be a death sentence for an ingredient or product because consumers may not pay much attention to ingredients. New research from Innova Market Insights shows that only 36% of North American consumers describe their approach to healthy eating as limiting ingredients that are bad for them. Many also don't check ingredient lists on packaging.

So, although tracking cultural conversations around demonized ingredients is essential, immediate action to remove them from the food supply is not always necessary.

Ultra-processed foods (UPFs) are among the top types of demonized foods, as are many of the ingredients used in processing. Again, the volume of media and social media buzz may not mean that manufacturers need to reformulate.

Consumers do not have a clear understanding of food processing. Public health experts continue to debate the definition and safety versus harm of UPFs so consumer confusion is not surprising. About half of consumers surveyed in the US and Canada report eating UPFs no more than once a week; an unlikely reality given how available these products are, and how well they tend to sell. North American participants in a recent Innova survey note that they consume UPFs because they are affordable and taste good (41% each). Affordability and taste are two major purchase drivers for food and beverage products.

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PhytoPin®

PhytoPin® is pine phytosterols produced from the Les Landes forest in Southwest France by a vertically integrated manufacturer providing complete traceability. PhytoPin is >99% sterol isomers and is comprised of 75% Beta-sitosterol and just under 90% Beta-sitosterol and Beta-Sitostanol. It also contains about 12% campesterol and campestanol. This leaves <3% other sterol isomers in the product. Because of this, PhytoPin is an extremely efficient source of beneficial plant sterols with a high potency for meeting approved health claims.


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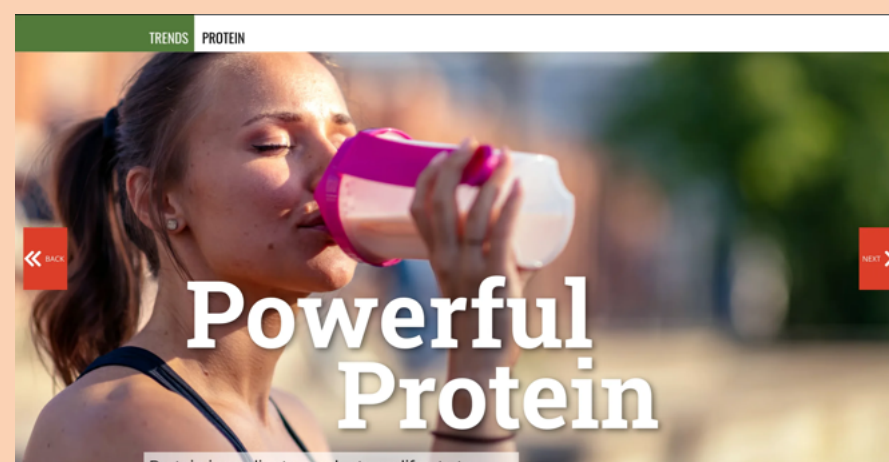
The terms "natural" and "clean" can suggest freedom from demonized ingredients such as artificial sweeteners, additives, and preservatives. Because these terms do not have regulated or agreed-upon definitions, they cannot be relied upon to indicate whether a product contains demonized ingredients. Also, 37% of North American consumers surveyed by Innova would compromise on natural flavors for a product to taste good.

"Our research shows that affordability and enjoyment are strong drivers of food choice, while demonized ingredients are not a major concern for most consumers," says Lu Ann Williams, global insights director at Innova Market Insights.

"The current US political landscape and weakened regulatory environment are poised to ramp up demonization of ingredients like seed oils, artificial colors, preservatives, and artificial sweeteners. But reduced government regulation could lead to an increase in a more harmful consequence, less protection against foodborne illnesses."

Innova is a global leader in market intelligence for CPG, including food, beverage, beauty, personal care, and household products. Learn more about its related research on ultra-processed foods at <https://www.innovamarketinsights.com/reports/ultra-processed-foods-global-consumer-trends-and-attitudes/>

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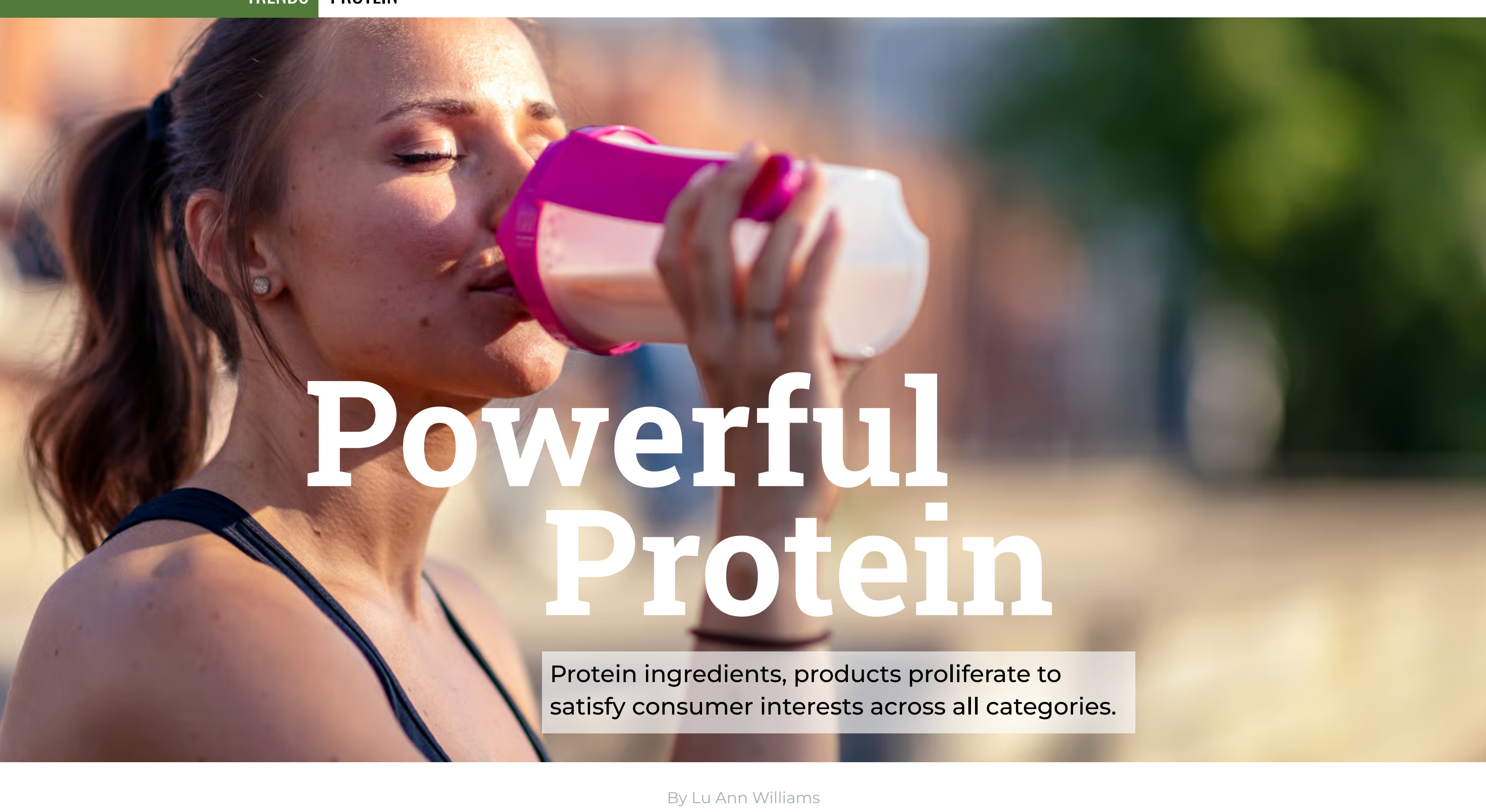
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Powerful Protein

Protein ingredients, products proliferate to satisfy consumer interests across all categories.

By Lu Ann Williams

What is the most popular nutrient in 2025? Protein. What was among the favorites in 2024? Protein. How about 2023 and 2022? Protein and protein.

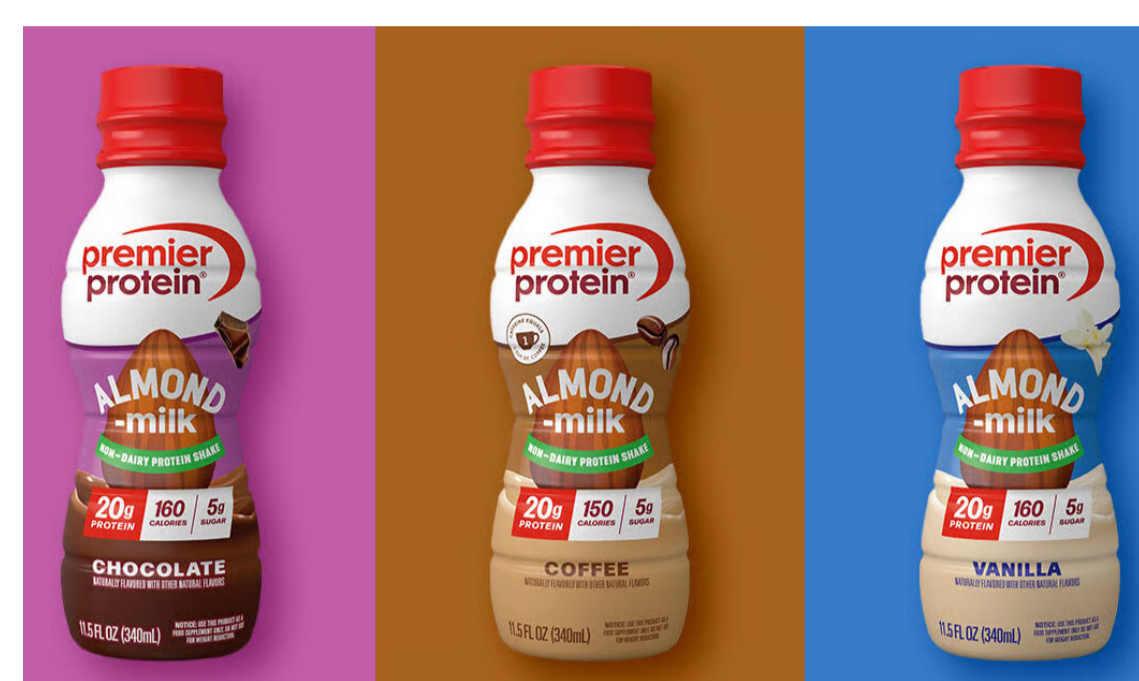
It's easy to be jealous of protein, the nutrient that most captivates American consumers year in and year out. US consumers associate protein with health and wellness, which is a top priority. They also link protein with desirable benefits such as energy, stamina, and weight management. And if some protein is good, US consumers consider more to be better.



Protein and Innova's Top Trends

Each year, Innova Market Insights resets its **Top 10 Trends** for food and beverage products in the coming year. We base these trends on several considerations—including global macro level forces, consumer trends, and changes in the food and beverage marketplace.

For 2025, our No. 1 trend is **"Ingredients and Beyond—Elevating Standards."** The trend captures the importance of ingredients such as protein to enhance product quality and value—especially in the eyes of consumers. Quality in ingredients and products ranks as the top consideration for consumers, with protein as an ingredient that connotes quality.



We see an emphasis on protein and protein content in both name brands and private label products. This demonstrates solid movement in private label to match their branded counterparts' product quality attributes, including protein content.

Our No. 2 trend, **"Precision Wellness,"** also embraces protein. Precision wellness incorporates several factors—including personalized approaches to health and **functional nutrition**; as well as individually selected ingredients, like protein. In pursuing personalized wellness, consumers consider their own health priorities, including consuming more protein, as the foundation for diet planning. Protein always seems to be a personal health priority, regardless of stage of life, health status, lifestyle, generation, or gender.

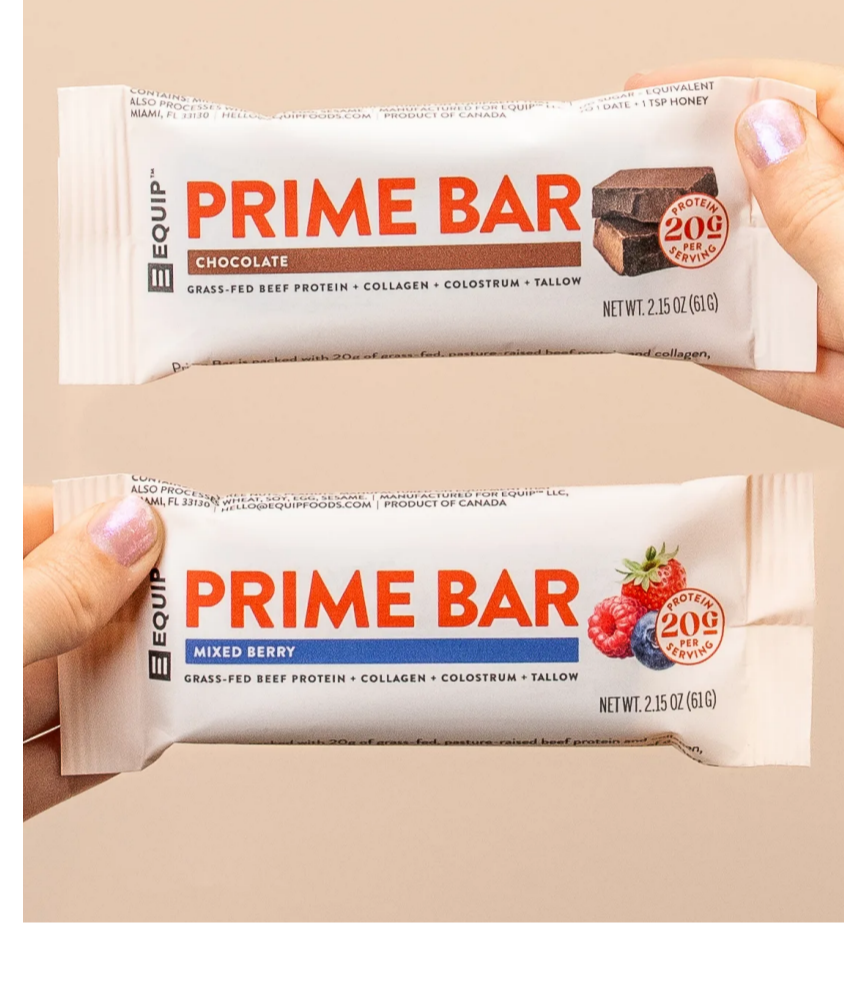


US Consumers Want More

Innova consumer trends surveys demonstrate how protein resonates with **US consumers**. When asked what type of diet they follow, one-quarter of US consumers—including more men than women—name a high-protein diet. Protein also appeals across generations. That said, younger generations more than older (and especially more than Boomers) say they follow a high-protein diet. Income level also impacts protein intake. US consumers at a mid-high- or high-income level are more likely to report following a high-protein diet than are consumers at middle- or lower-income levels.

US consumers also focus on protein as an essential ingredient. Two in five North American consumers we surveyed name protein as the most important ingredient. They strive to consume enough protein particularly to help them build muscle and **manage their weight**.

We drilled down in our survey questions to examine the types of protein preferred by US consumers. Most consumers choose familiar meat and dairy protein sources, although we spotted growing consumer interest in dairy alternatives and meat substitutes. The dairy alternative bases that are most familiar to and popular among consumers—including rice, oat, almond, and coconut—are not particularly high in protein. Some dairy alternatives contain added protein, often pea protein. Consumers say they replace meat most often with eggs, fish, and seafood. However, they also report being willing to buy meat substitutes and dairy alternatives that have familiar ingredients.



Other features in meat substitutes and dairy alternatives could appeal to consumers in the US. The US consumers we surveyed are looking for lower prices, **better flavor**, and texture improvements. Reduced sugar also resonates with consumers. Noticeable proportions of consumers read labels and expect plant-based alternatives to offer comparable nutrition to their animal-based counterparts.

Protein Ingredients and Innovation

Data collected as part of our 24x7 monitoring of new product launches show that protein claims are the most prevalent claims in **plant-based**, dairy, and egg-based products. We even see protein claims emerging in limited-edition and seasonal product launches.

Despite the enduring popularity of protein, we observe that launches with **protein ingredients**—with or without a protein claim—are growing more slowly than food and beverage launches overall. Furthermore, incorporation of protein ingredients into new product launches may have peaked. This could be the sign of a mature and stable marketplace with saturation in protein penetration across categories.



Still, protein ingredients help drive product innovation. This is especially true with meat and dairy products, meat substitutes and dairy alternatives, ready meals, side dishes, and sports nutrition offerings.

Popular protein ingredients are whey protein, which also can be produced via precision fermentation, and casein protein. Whey and casein protein appeal particularly in sports nutrition products, where they aid in muscle repair and muscle building. Egg protein, mainly in the form of egg albumen or egg albumen powder, is most often used in bakery and confectionery launches.

Plant-protein ingredients are experiencing solid growth and have been the most widely used protein ingredients. This is partly in response to consumer demand for healthier and more sustainable protein options. Plant proteins often appear as protein enhancements or as replacements for animal protein in products with plant-related claims such as plant-based, vegetarian, and vegan. Soy protein and wheat protein are the most commonly used alternatives. We also see growth in textured proteins from wheat, pea, and vegetables that provide a meat-like consistency to ground meat substitute products.



Technology and Protein Ingredients

Manufacturers can turn to precision fermentation to generate specific protein ingredients. Moreover, this technological process is promoted as a more efficient and sustainable protein production method. Among the animal-free proteins that can be produced via precision fermentation are beta-lactoglobulin as a whey protein alternative; alpha-lactalbumin for infant formula; the egg protein replacements ovalbumin and ovomucoid; and heme proteins that provide meat-like color and flavor, collagen, and gelatin.



Cultured protein, including mycoprotein, represents a newer type of protein ingredient. US product launches with mycoprotein are limited to one meat substitutes processor. Success of this ingredient will require wider use and adoption.



Protein and Package Claims

It is not surprising that **"high / source of protein"** is the top US claim on food and beverage launches with added protein ingredients. US consumers are highly interested in protein and are likely to respond to labels calling out this nutrient. An important claim pairing features a protein claim plus a plant-based lifestyle claim such as **vegan** or **vegetarian**.

Informed followers of **vegan** and **vegetarian** diets recognize the challenge of consuming enough protein so guidance toward protein sources could be appealing and reassuring.

Several other claims often appear on products with a protein claim. Sugar-related claims are on the rise, especially for dairy, dairy alternatives, and other categories with both protein and sweetness. **Gluten-free** claims may appear on products with a protein claim—as **gluten-free** often is paired with other health-related claims.

Limited-edition and seasonal launches with protein claims, especially in confectionery and bakery, demonstrate that protein is important to consumers during all occasions throughout the year.

Challenges and Opportunities

Innova's No. 5 trend for 2025, **"Plant-based-Rethinking Plants,"** reflects consumer sentiment toward plant-based products that imitate their meat counterparts. Plant-based continues to evolve—shifting from substitutes and alternatives for meat and dairy—to new concepts that embrace whole plant ingredients. Because many plant foods are not high in protein, manufacturers may need to reformulate products in a way that honors the plant and yet delivers enough protein to qualify for a protein claim. Beans, peas, and lentils are among the higher protein plant ingredients that could be incorporated into plant-based offerings.

US survey participants stress the importance of and desire for naturalness, a clean label, and responsible sourcing. They also are concerned about ultra-processed foods. This puts pressure on companies to embrace simpler, plant-based formulations and whole food alternatives to animal products. Of course, good taste and an attractive price point also are important to today's consumer.

Protein enhancement presents both challenges and opportunities. The impact of protein ingredients on taste and texture continues to be a challenge. Addition of clear protein ingredients to clear beverage products broadens the potential for protein claims.

Consumers who are not accustomed to clear protein ingredients may need to be educated on how carbonates and sports drinks can be a protein source.

As consumers seek personalized nutrition, they are likely to look for protein solutions to their health and lifestyle needs. Industry players will need to tailor protein solutions to various target populations.

And finally, technology is positioned to change the marketplace for products featuring protein. Our No. 10 trend, **"AI-Bytes to Bites,"** highlights how artificial intelligence (AI) and technological innovation change how we live and what we eat. AI has begun to reshape product innovation and production—from ingredient sources to ingredient combinations, flavor development, production, and labeling. The future holds opportunities for AI to disrupt the protein marketplace with new products, new protein ingredients, and new personalized and precision nutrition protein solutions.

Lu Ann Williams is Global Insights Director at Innova Market Insights, provider of market research services including the Innova Database. With more than 25 years' experience in the food industry, Lu Ann is a trend expert and frequent public speaker at events worldwide. She leads a team of analysts and works with global clients. Contact her at luann.williams@innovami.com

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Building Better Bodies

We're all aging—some faster than others, it seems—and that means our nutritional needs are changing.

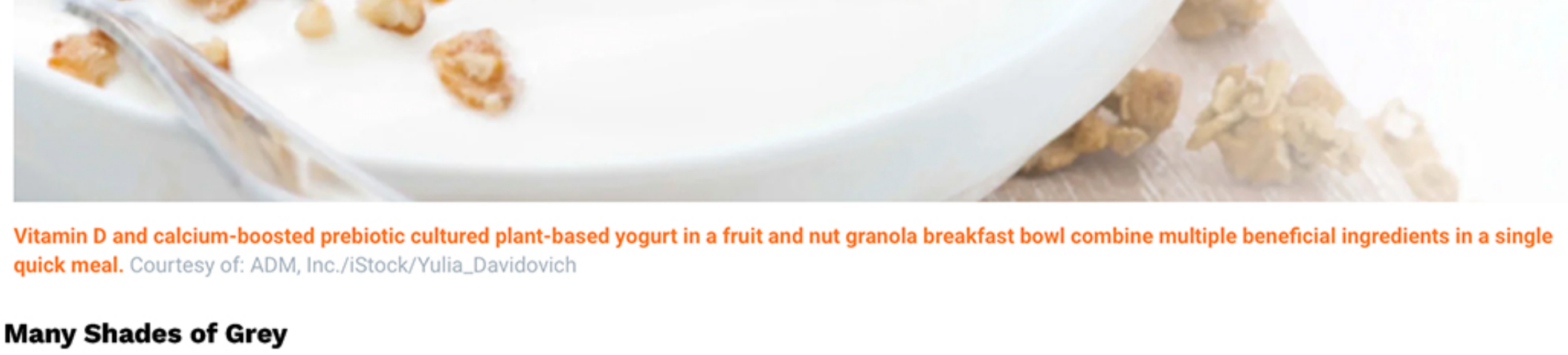
Consumers aged 50 and older might be more active than ever, but they still have exclusive nutritional needs. Credit: skynesher/Getty Images

by Alexa Bosshardt, MPS, RDN

In every generation, what constitutes aging changes. In 1875, the average life expectancy was about 45 years. Today, it's about 80 years. Each day, we wake up a day older but without an operable time machine to whisk us back to our youth. Yet our bodies run on systems that haven't adapted much to a life expectancy that has almost doubled in 150 years.

Age-related decline, especially in immunological function and its impact on life expectancy and quality of life—known by the term “immunosenescence”—includes both the innate and adaptive immune system responses. But the universal goal is to be physically active through that entire “extra” three and a half decades. This requires a focus on dietary choices and nutrients that support heart, eye, bone, and skin health, as well as performance (both physical and cognitive) and especially energy.

As we age, we often become more drawn to health-enhancing and anti-aging claims of various diet regimens, pills and powders, topical applications, and the proliferation of foods and beverages that promise extraordinary or unique benefits. A key factor in any diet as we age is understanding the concept of nutrient density. Calories count as our bodies need fewer of them to adjust to age-related shifts of fat and lean mass and a more sluggish metabolism.



Vitamin D and calcium-boosted probiotic cultured plant-based yogurt in a fruit and nut granola breakfast bowl combine multiple beneficial ingredients in a single quick meal. Courtesy of: ADM, Inc./iStock/Yulia_Davidovich

Many Shades of Grey

Protein, fiber, and brain health are among the top consumer interests driving food and beverage purchases. Consumers strive to choose foods and beverages that pack an enriched or fortified nutritional punch over other similar category choices. They understand the need to optimize nutrients from foods and beverages rather than depending on supplements, aware that a handful of supplements won't unravel years of neglect.

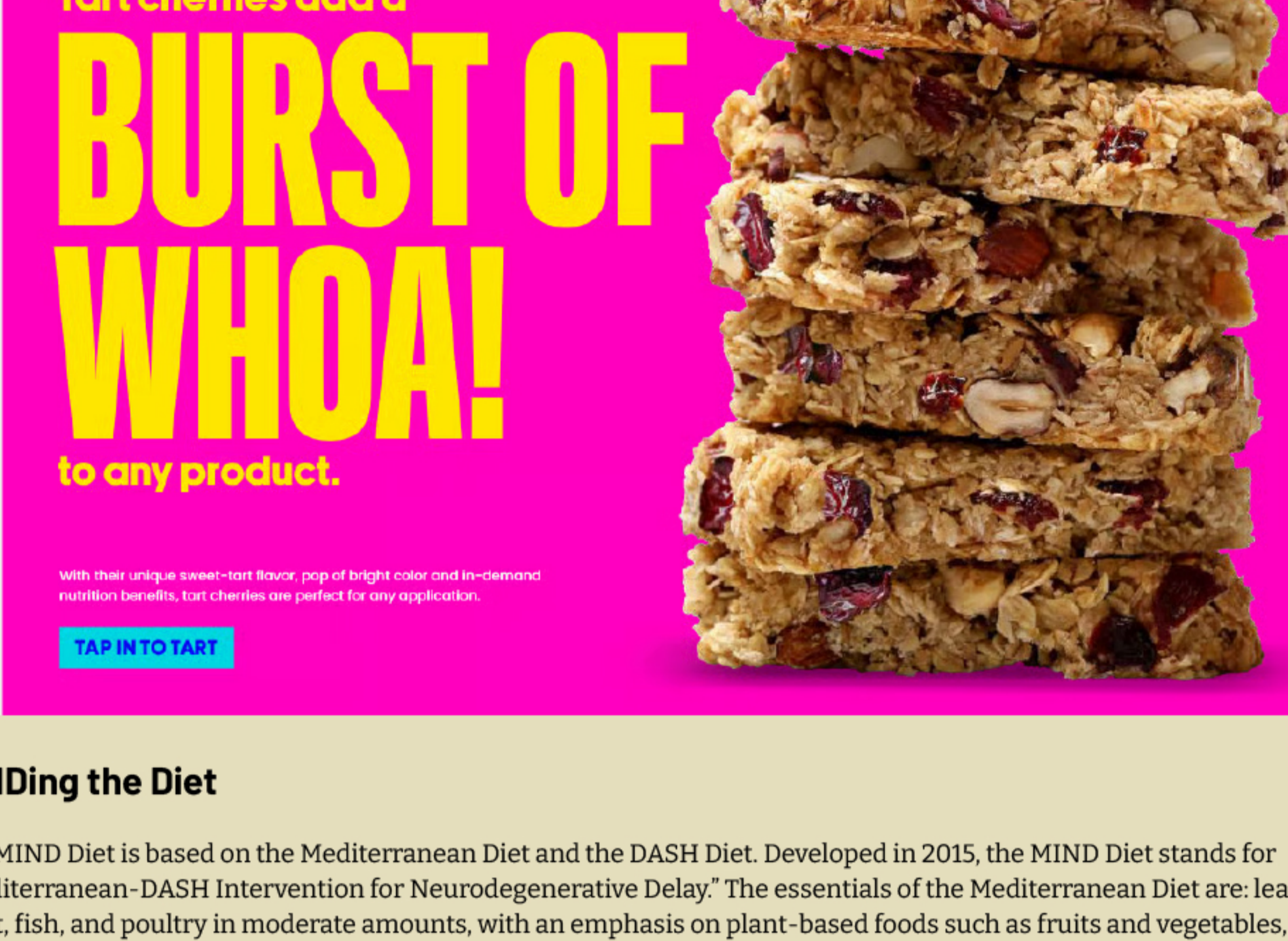
Today's informed consumers recognize that applying some basic guidelines for building a healthier aging body can help reduce the risk of numerous chronic diseases, improve general circulation, support immunity, and maintain bone and brain health.

“Inflammaging” is a recent term that refers to the chronic inflammation that is an inevitable part of the aging process. Inflammation carries a negative connotation, yet it is a proactive response by the body's immune system to any physical or physiological injury, disease, infection, bacteria, or virus that might negatively impact it. The decline of the inflammatory response with aging signals the body's resistance to healing. This leads to an increased risk for chronic conditions, including Alzheimer's, arthritis, certain cancers, type-2 diabetes, and cardiovascular diseases.

While the macroingredients of protein, healthy fats (such as omega oils), and complex carbohydrates (including fibers, oligosaccharides, and resistant starches) are at the top of most lists for supporting the aging form, a range of micronutrients from minerals, vitamins, co-vitamins, botanicals, and mushrooms are moving into the forefront of better-for-you formulations.



Many older adults reduce their consumption of meat, poultry, and eggs, yet these are major sources of much-needed protein, coenzyme Q10, and iron. Credit: Verdo Farms, LLC



MINDing the Diet

The MIND Diet is based on the Mediterranean Diet and the DASH Diet. Developed in 2015, the MIND Diet stands for “Mediterranean-DASH Intervention for Neurodegenerative Delay.” The essentials of the Mediterranean Diet are: lean meat, fish, and poultry in moderate amounts, with an emphasis on plant-based foods such as fruits and vegetables, whole grains, nuts, seeds, and legumes, and olive oil as the preferred dietary fat. It favors fatty fish (including salmon) that are high in omega-3 fatty acids. The DASH Diet (Dietary Approach to Stop Hypertension) focuses on reducing risk factors for heart disease. Based on the ideal that cardiovascular health is closely related to brain health, the MIND Diet blends the virtues of the Mediterranean Diet with elements of DASH, including emphasis on dark green leafy vegetables and berries over other vegetables and fruits. Several studies to date have demonstrated overall healthful outcomes of the MIND Diet, including lowered risk of dementia and slowed cognitive decline over time.

Good Bones

For persons past the age of 40, bone density becomes a watchworthy issue, regardless of gender. Although women tend to lose bone mass at a greater rate than men, at this stage of life all adults begin to break down bone at a faster rate than it is rebuilt, most especially with diminished activity.

In addition to the key nutrients for bone density—vitamin D and calcium—the minerals potassium, iron, selenium, and magnesium are crucial for both bones and the joints that support them. So, too, are vitamins C and K. While dairy and seafood are natural sources of bone-building nutrients, with so many consumers seeking vegetarian options, plant-based milks, cheeses, and other analogs should be fortified with calcium and vitamin D, as well as protein. Other products, such as juice beverages and bars, too, are increasingly fortified with these nutrients.



Nuts, especially walnuts, are rich sources of healthful omega-3 oils, as well as minerals, plant protein, fiber, and antioxidants. Courtesy of: California Walnut Commission

Vitamin C's role in bone-building includes being a necessary component for the laying down of the skeleton's support system via collagen. Collagen makes up about 30% of the body's proteins, mostly in connective tissue such as cartilage and tendons, as well as the supporting matrix for skin. Collagen supplementation in the form of collagen peptides has been shown to have a positive effect on skin elasticity and hydration. Collagen is essential for proper wound healing as well, and zinc and copper also play a role in collagen production.

The primary amino acids in collagen are *proline*, *hydroxyproline*, and *glycine*, which are abundant in meat, fish, poultry, legumes, soy, and dairy. Virtually all animal-based, high-quality, complete sources of protein, as well as plant-based protein sources that can be complemented with whole grains to enhance their bioavailability, are considered dietary sources of the amino acid precursors necessary for collagen production.



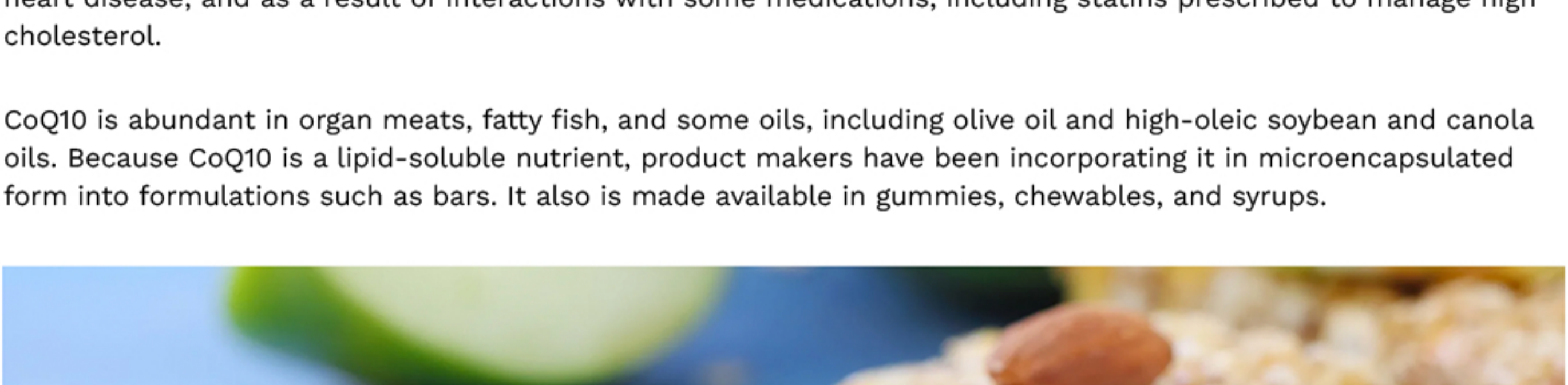
Curcumin, the bioactive component of turmeric, has demonstrated powerful anti-inflammatory and antioxidant capacity plus strong anti-aging effects on DNA. Courtesy of: Arjuna Natural, Ltd.

Hearts and Minds

The fat-soluble co-vitamin coenzyme Q10 (CoQ10) also known as *ubiquinone*, is important for the skin against oxidative stress and premature aging. It is needed in small quantities to enhance collagen production, but more importantly, it is critical to heart function. While deficiencies are rare in the younger population, most adults begin to experience a drop in heart function starting around age 35.

Although CoQ10 synthesis declines with age, it can also be depleted under certain medical conditions, including heart disease, and as a result of interactions with some medications, including statins prescribed to manage high cholesterol.

CoQ10 is abundant in organ meats, fatty fish, and some oils, including olive oil and high-oleic soybean and canola oils. Because CoQ10 is a lipid-soluble nutrient, product makers have been incorporating it in microencapsulated form into formulations such as bars. It also is made available in gummies, chewables, and syrups.



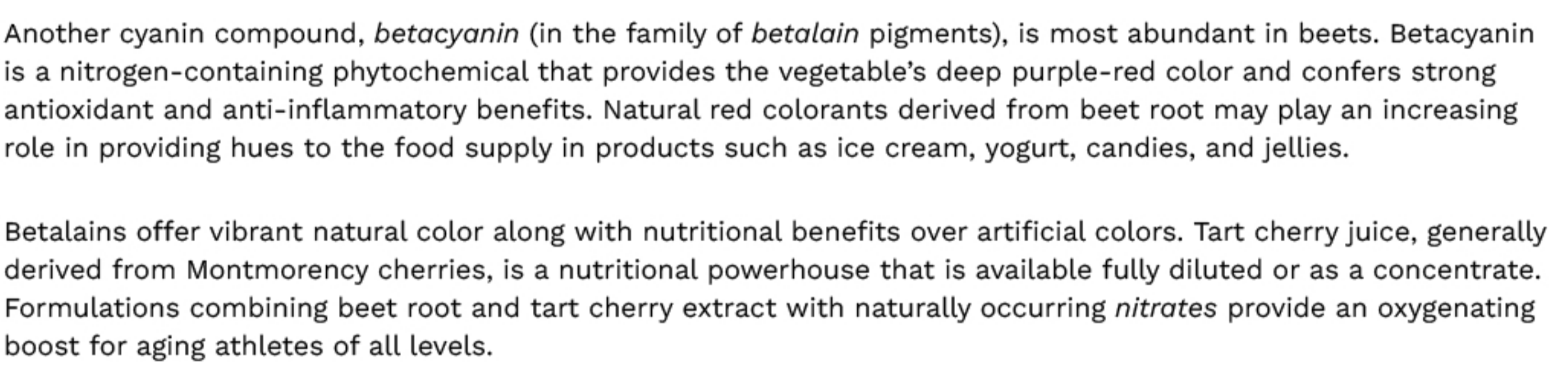
Dietary fibers, such as inulin and other fructo-oligosaccharides, and the short-chain fatty acids produced by probiotic bacteria they feed, enhance gut health and have shown potential for improving age-related dysfunctions. Credit: BENE0, GmbH/Gamzova Olga

Micronutrient Stars

Red and purple fruits and vegetables, including cherries, blueberries, raspberries, pomegranates, red cabbage, and black beans, are rich sources of *anthocyanins*. These powerful pigments are categorically unmatched for their antioxidant, anti-inflammatory, antidiabetic, anticancer, and cardiovascular-protective medical benefits.

Another cyanin compound, *betacyanin* (in the family of *betalain* pigments), is most abundant in beets. Betacyanin is a nitrogen-containing phytochemical that provides the vegetable's deep purple-red color and confers strong antioxidant and anti-inflammatory benefits. Natural red colorants derived from beet root may play an increasing role in providing hues to the food supply in products such as ice cream, yogurt, candies, and jellies.

Betalains offer vibrant natural color along with nutritional benefits over artificial colors. Tart cherry juice, generally derived from Montmorency cherries, is a nutritional powerhouse that is available fully diluted or as a concentrate. Formulations combining beet root and tart cherry extract with naturally occurring *nitrates* provide an oxygenating boost for aging athletes of all levels.



Collagen peptides have gained abilities to help improve joints, skin, and other soft tissues that are among the first areas to show visible signs of aging. Courtesy of: Nitta Gelatin, NA

Nutrients that play central roles in reducing inflammation and boosting immunity include the mineral zinc and antioxidant vitamins A, C, and E. Zinc is involved in the proper functioning of white blood cells and *free radicals*, both critical to immunity. Zinc also participates in antioxidant activity to protect cells from oxygen and neutralize that damage cellular DNA and accelerate the aging process.

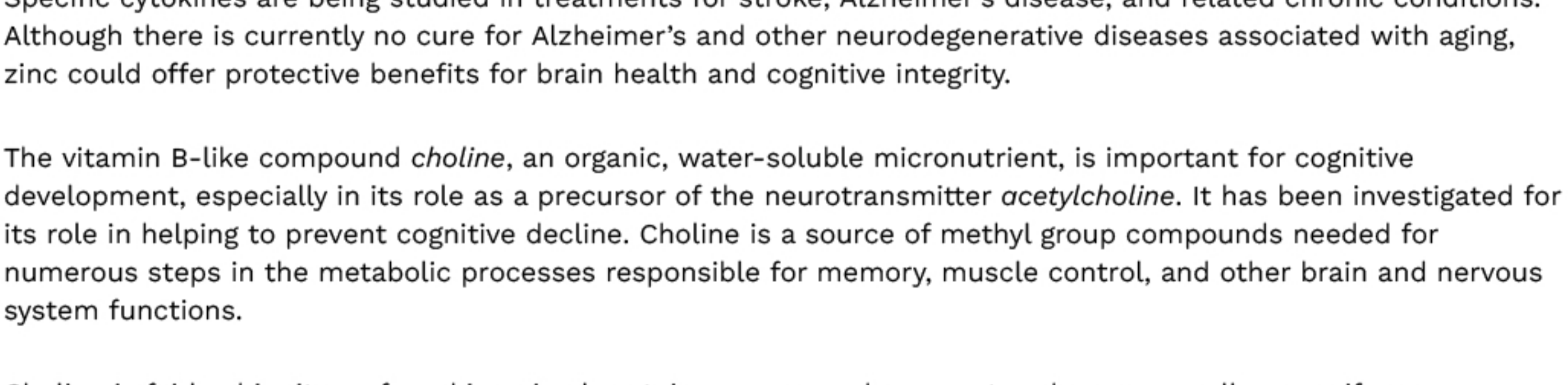
An invisible marker for zinc deficiency with advancing age is impaired *cytokine* production. Cytokines are a class of proteins involved in both pro- and anti-inflammatory cellular activity in the body. They're related to immunity as well as pathological pain management. Proper cytokine function is critical as we age.

Specific cytokines are being studied in treatments for stroke, Alzheimer's disease, and related chronic conditions. Although there is currently no cure for Alzheimer's and other neurodegenerative diseases associated with aging, zinc could offer protective benefits for brain health and cognitive integrity.

The vitamin B-like compound *choline*, an organic, water-soluble micronutrient, is important for cognitive development, especially in its role as a precursor of the neurotransmitter *acetylcholine*. It has been investigated for its role in helping to prevent cognitive decline. Choline is a source of methyl group compounds needed for numerous steps in the metabolic processes responsible for memory, muscle control, and other brain and nervous system functions.

Choline is fairly ubiquitous, found in animal protein sources such as meat and eggs, as well as cruciferous vegetables and other plant foods. Because of this, choline is not a nutrient typically tracked for deficiency. However, certain other nutrients can negatively impact absorption of choline, leading to inadequate levels. This is especially the case with some vegan diets, as animal proteins are rich in the essential amino acid *methionine*, which contributes to choline balance. Other compounds that can interfere with choline include *betaine* (abundant in beets, spinach, whole grains, and seafood), and *folate* (an essential B vitamin found in dark green leafy veggies and legumes).

There also are choline-related compounds, such as *phosphatidyl choline*, that have displayed a variety of benefits that can be especially helpful for older consumers. Phosphatidyl choline has a number of capacities that range from anti-inflammatory action to supporting cell-membrane health, participating in neurotransmitter production, and contributing to brain function, weight management, cardiovascular function, and even digestive health.



Anatto is a concentrated source of *tocotrienol* a more powerful antioxidant form of vitamin E than *tocopherol* and which has demonstrated anti-cancer capacity. Courtesy of: American River Nutrition, LLC/Dr. Barrie Tan

Ancient Medicine, Modern Approach

Medicinal mushrooms have been moving to the forefront of the nutritional efforts to help mitigate the deleterious effects of aging. Honey mushrooms (*Armillaria mellea*), lion's mane (*Hericium erinaceus*), reishi (*Ganoderma*), Cordyceps sub., and chaga mushrooms (*Inonotus obliquus*) are among the many medicinal mushrooms promoted for their antioxidant properties, immunological benefits, and ability to fight free radicals formed by exposure to environmental stressors. Lentinan, found in shiitake mushrooms, is an example of some of the scores of naturally occurring bioactive substances in mushrooms. It boasts significant antioxidant and anti-inflammatory benefits. Lentinan has been widely used in traditional Chinese medicine for anti-tumorogenesis, treating certain cancers, and to prevent inflammation.

Referred to as adaptogenic mushrooms, they are most commonly available in supplement form as capsules or powders, but also put to work as ingredients in nutritive, high-fiber bars based on plant proteins such as those from pea and fava; or blended into herbal teas and other liquid “elixirs.” Since herbal teas generally do not include ingredients from true tea plants (*Camellia sinensis*), they may be referred to as “herbal tisanes.”

Alexa Bosshardt, MPS, RDN, is a research chef and hands-on industry consultant who has devoted most of her career to providing recipe formulation and nutritional marketing services to food and beverage manufacturers and restaurant chains. With a culinary degree from Johnson & Wales, and multiple degrees from Cornell University, Bosshardt has enjoyed more than three decades of teaching ServSafe and Culinary Nutrition courses, as well as corporate wellness classes. She currently consults for several CPG companies. Read more of her articles on the sweet things in life at www.preparedfoods.com. She can be reached at alexa@fitculinary.com.

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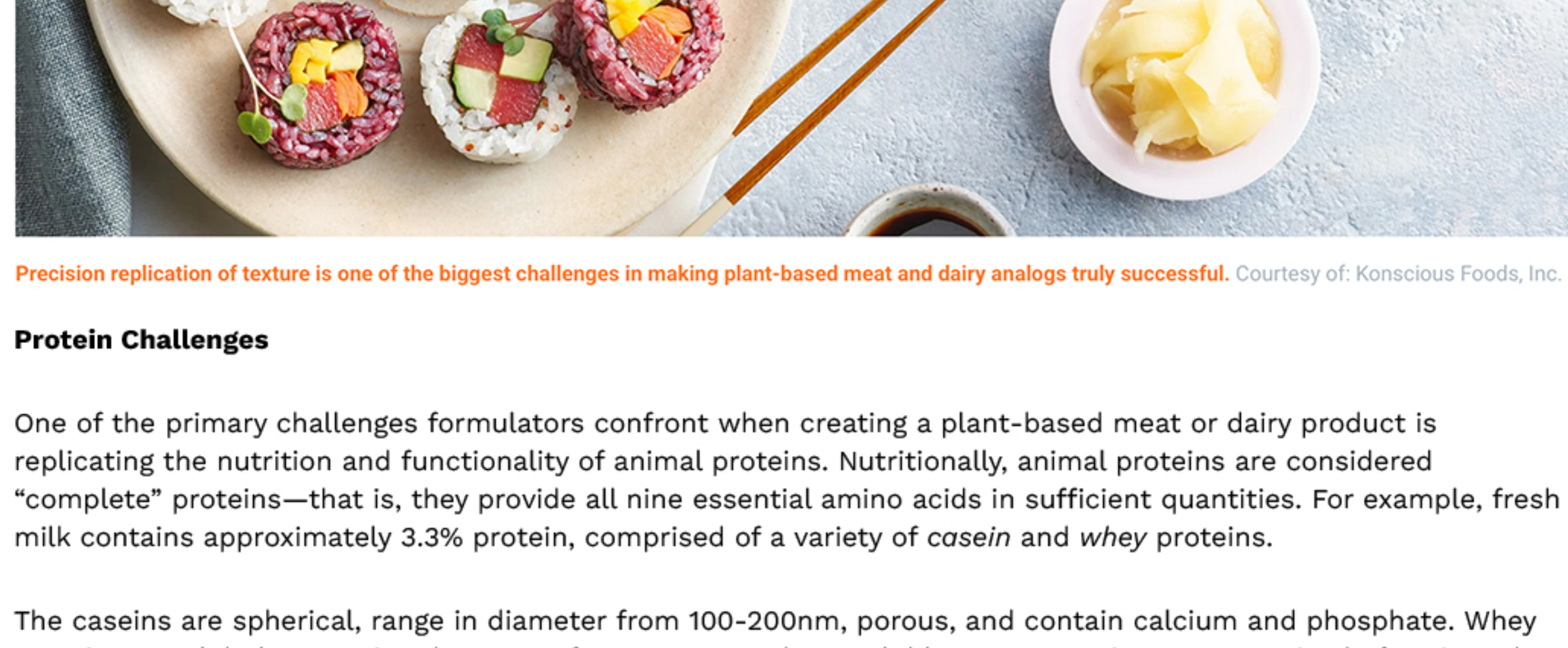
Brigding The Texture Gap

Ingredient innovations are bringing plant-based dairy and meat analogs closer than ever to the original.

by Neshia Zalesny, MBA, BS

The global demand for plant-based foods has surged in recent years, driven by a convergence of consumer interest in health, sustainability, and ethical sourcing. Once considered a niche market, plant-based alternatives have become a mainstream choice for health-focused consumers following a flexitarian or vegetarian diet, as well as for a growing number of consumers in general.

Hydrocolloids, natural fibers, or enzymes combined with plant-based proteins are potent tools for product developers in this space. Advances in protein extraction and ingredient innovation have enabled the development of plant-based dairy and meat analogs that closely mimic the flavor, texture, and functionality that consumers expect from traditional products.



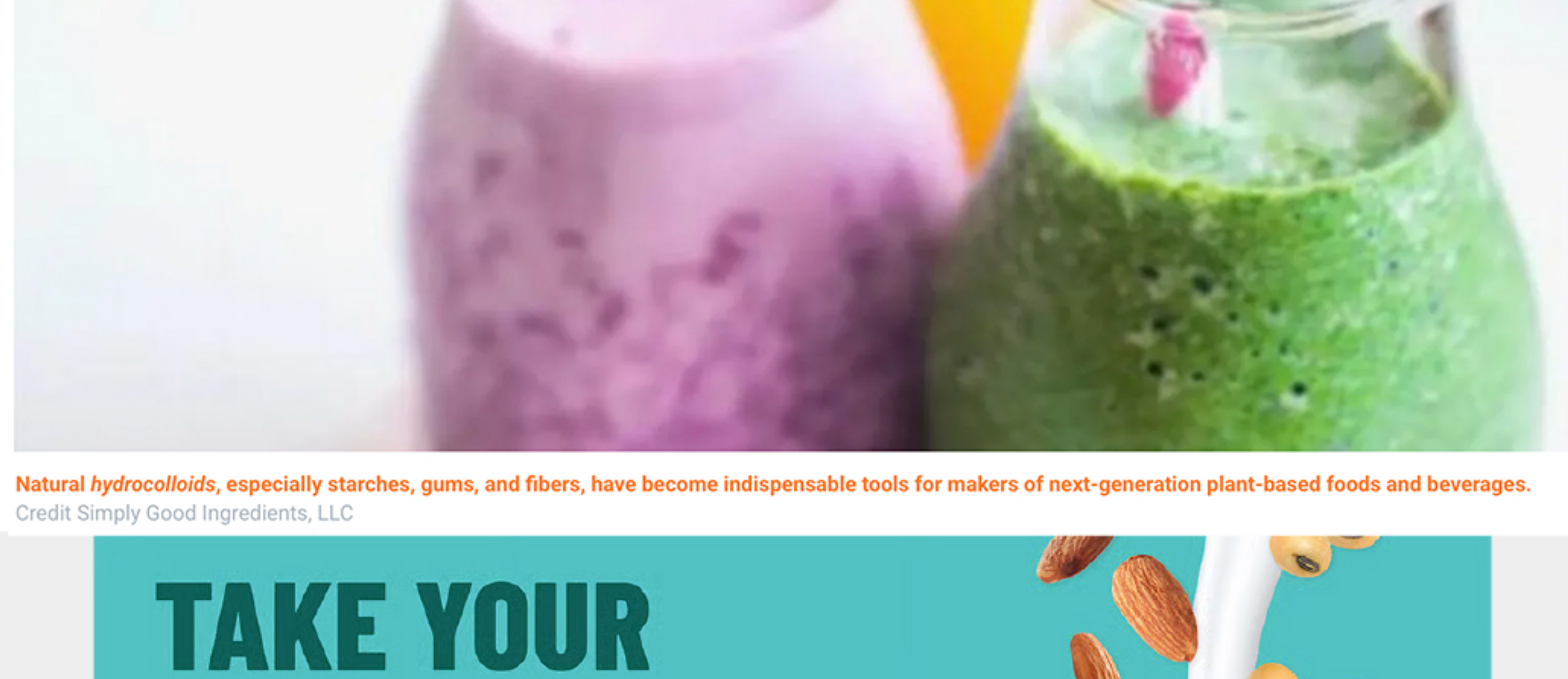
Precision replication of texture is one of the biggest challenges in making plant-based meat and dairy analogs truly successful. Courtesy of: Konscious Foods, Inc.

Protein Challenges

One of the primary challenges formulators confront when creating a plant-based meat or dairy product is replicating the nutrition and functionality of animal proteins. Nutritionally, animal proteins are considered “complete” proteins—that is, they provide all nine essential amino acids in sufficient quantities. For example, fresh milk contains approximately 3.3% protein, comprised of a variety of *casein* and *whey* proteins.

The caseins are spherical, range in diameter from 100-200nm, porous, and contain calcium and phosphate. Whey proteins are globular proteins that range from 3-6nm and are soluble. Meat proteins are comprised of *actin* and *myosin*-based fibrous structures. These structures are generally highly digestible when the meat is cooked and eaten.

Plant-based proteins from seeds and legumes (such as chia, guar, soy, pea, chickpeas, or beans) also are globular. The extracted proteins can range in size from 100-1,000nm, depending on processing methods. These proteins often have a highly dense, tightly folded tertiary structure. For many plant-based proteins, this structure is maintained even in the acidic environment of the stomach, making them less digestible. This inhibited digestibility makes achieving nutritional parity with traditional animal products challenging.



Natural hydrocolloids, especially starches, gums, and fibers, have become indispensable tools for makers of next-generation plant-based foods and beverages. Credit: Simply Good Ingredients, LLC

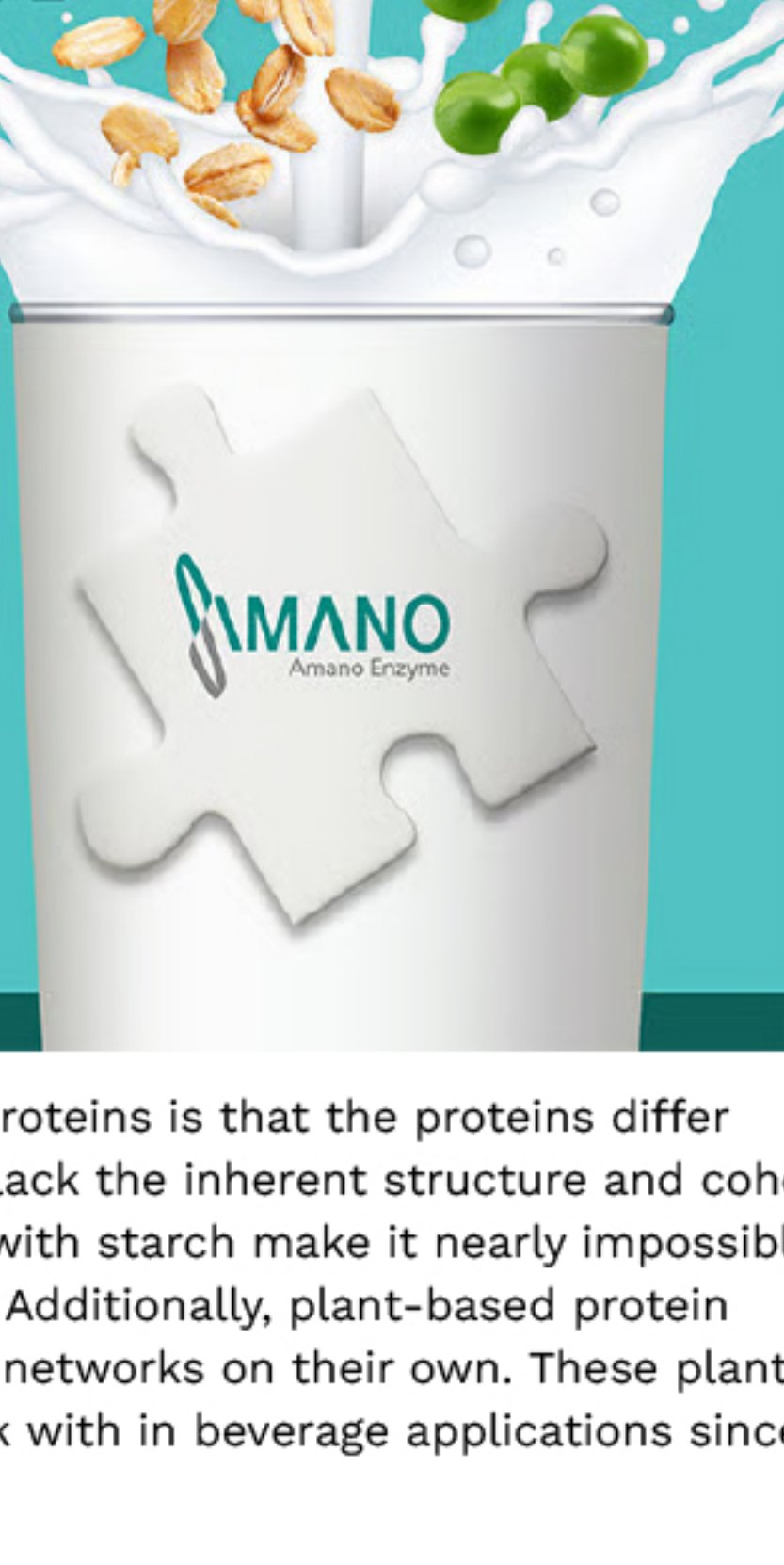
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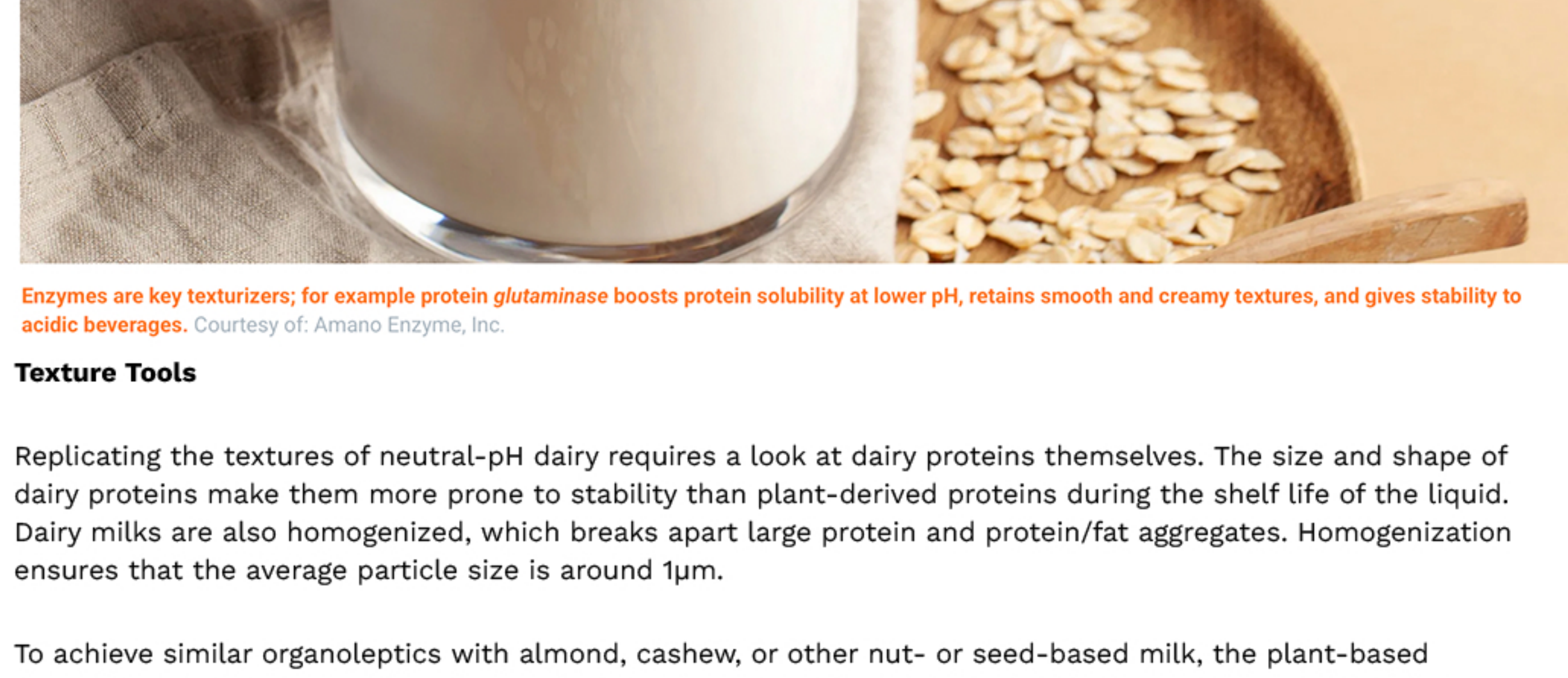
Haven't you herd? Amano's enzyme solutions help you become the preferred choice for plant-based dairy products.

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One of the primary hurdles to formulating plant-based foods with these proteins is that the proteins differ significantly from traditional animal-based products. Plant proteins often lack the inherent structure and cohesion of animal proteins. For dairy products, the globular proteins intermingled with starch make it nearly impossible to add sufficient protein to reach the level naturally found in dairy products. Additionally, plant-based protein globulins pack into larger globular protein bodies and do not form fibrous networks on their own. These plant protein molecules also contain starch, which can make them hard to work with in beverage applications since viscosity is crucial.

The globular nature of plant proteins also makes it difficult to use them to replicate the fibrous texture and binding properties of meat protein. Issues such as water retention, emulsion stability, and bite characteristics often end up falling short, resulting in products that can either end up too dry and crumbly or too wet and mushy. Either outcome will lack the satisfying mouthfeel consumers expect.



Enzymes are key texturizers; for example protein glutaminase boosts protein solubility at lower pH, retains smooth and creamy textures, and gives stability to cheese analogs. Courtesy of: Amano Enzyme, Inc.

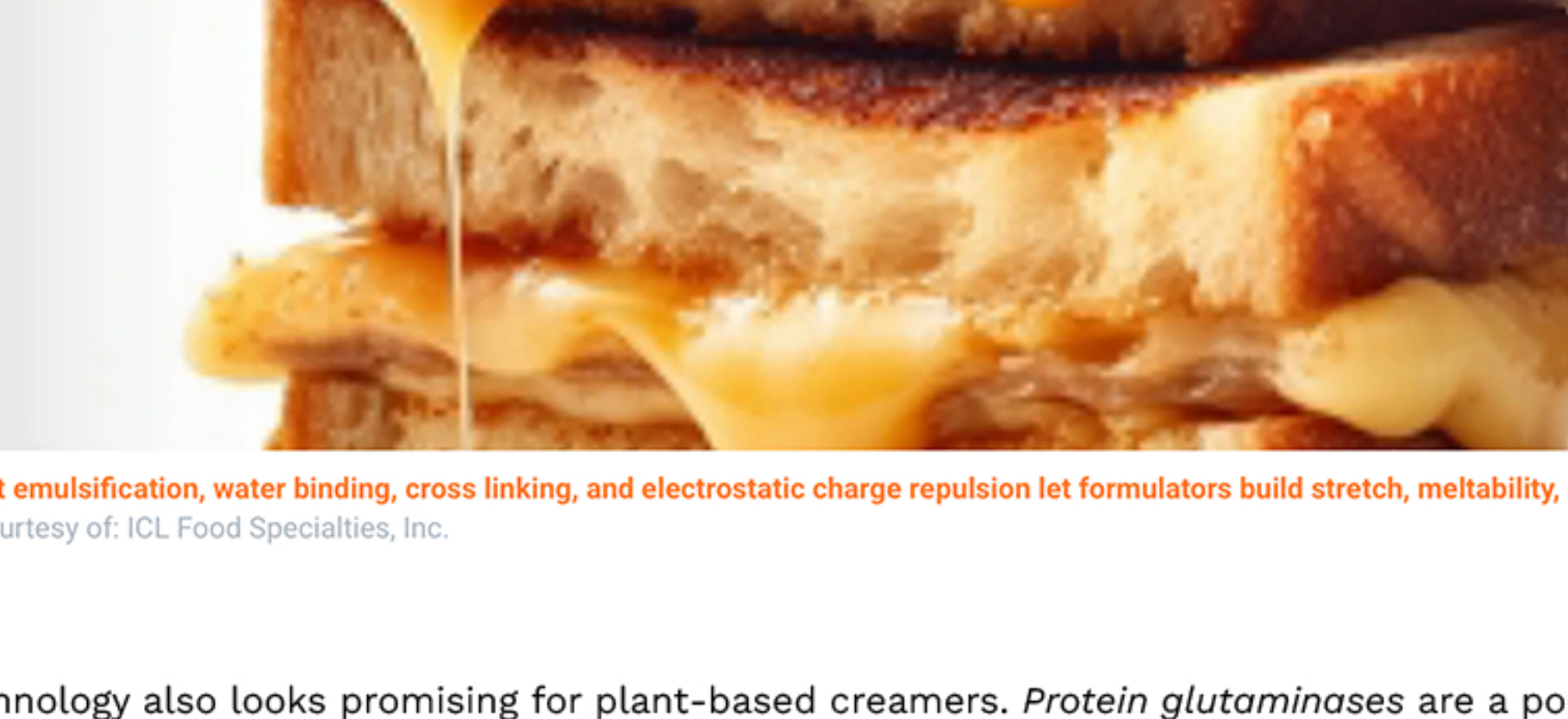
Texture Tools

Replicating the textures of neutral-pH dairy requires a look at dairy proteins themselves. The size and shape of dairy proteins make them more prone to stability than plant-derived proteins during the shelf life of the liquid. Dairy milks are also homogenized, which breaks apart large protein and protein/fat aggregates. Homogenization ensures that the average particle size is around 1µm.

To achieve similar organoleptics with almond, cashew, or other nut- or seed-based milk, the plant-based formulation is typically produced by soaking ground nut meal in water, then filtering and homogenizing the resulting liquid. The result is essentially flavored water with little protein or fat—and little resemblance to dairy milk. Formulators then add vitamins, minerals, protein, and possibly a small amount of fat.

Most of these ingredients will either sink to the bottom or float to the surface of the bottle. Therefore, plant-based milks generally require the addition of hydrocolloid systems, such as *gellan gum* and *galactomannans*. These systems also commonly include *guar gum*, *tara gum*, or *carob* (locust) bean gum. This hydrocolloid system is nearly ubiquitous in commercial products.

High-acyl gellan gum, used at a concentration of 0.03-0.035%, is primarily employed to suspend vitamins, minerals, and any added protein. Gellan gum has a very clean mouthfeel, so galactomannans are often added, at levels of less than 0.1%, to enhance texture. For products containing added fat, citrus fiber may be an effective addition to help stabilize the oil.



Proteins that impart emulsification, water binding, cross linking, and electrostatic charge repulsion let formulators build stretch, meltability, and mouthfeel into enzyme action. Courtesy of: ICL Food Specialties, Inc.

Enzyme Action

New enzyme technology also looks promising for plant-based creamers. *Protein glutaminases* are a popular example. They open the tightly packed globular protein, making it more “fluffy” and able to remain suspended in liquid. Hydrocolloids work by physically altering the water phase by thickening or suspending particles.

Enzymes act biochemically, modifying proteins, *polysaccharides*, or lipids at a molecular level. They have the advantage of not needing to be included on the ingredient declaration. However, enzymes need to be added and held at 55°C/131°F for one hour before processing. Dairies that produce lactose-free milk are set up to handle these processing guidelines, but many beverage processing facilities are not.

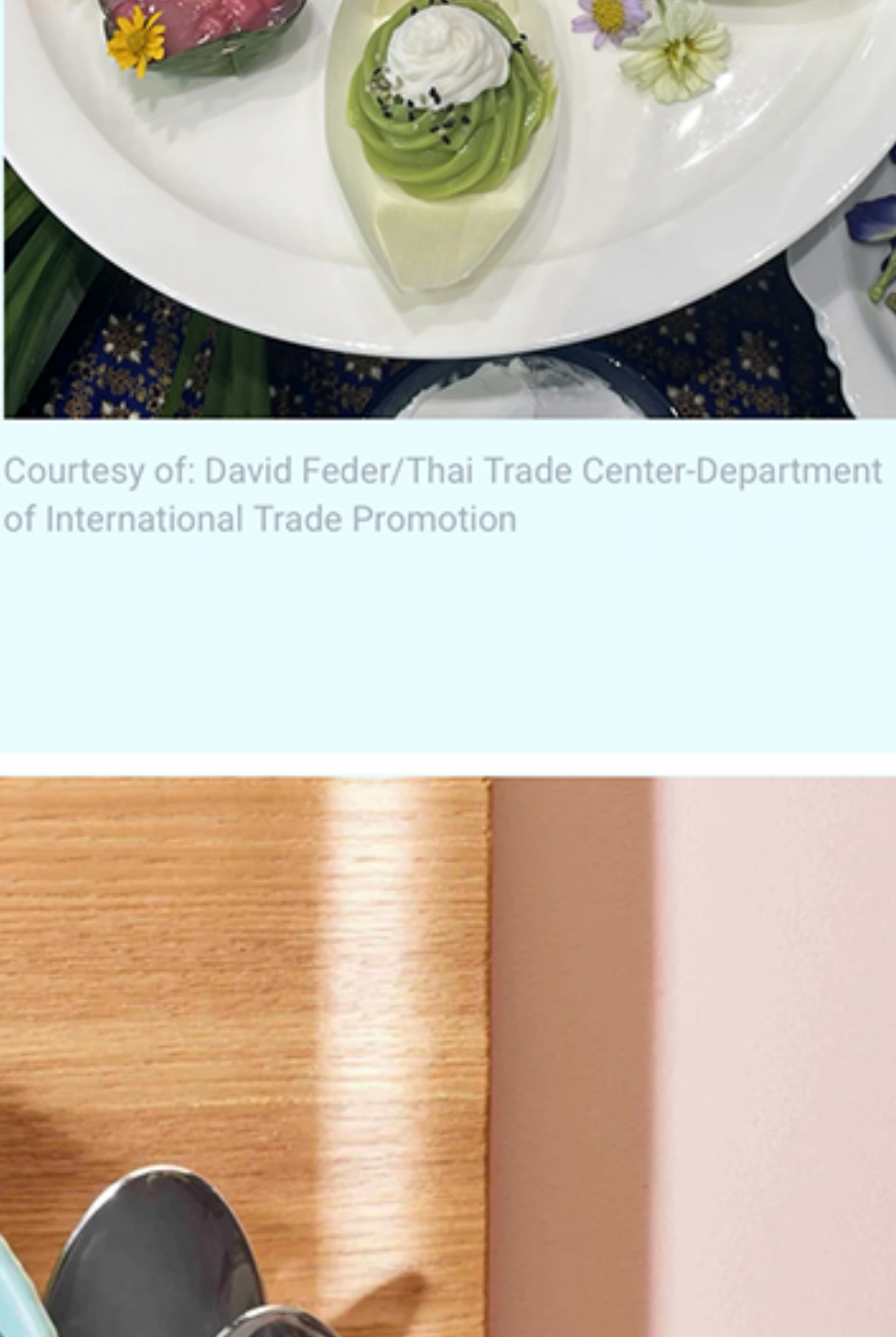
Better-For-You Texture

by David Feder, Executive Editor—Technical

Tapioca—also known as *cassava*—is experiencing a functional ingredient renaissance due to its versatility, its variety of forms, and its health properties. One form, called variously tapioca starch or tapioca flour, works particularly well as a texturizer in gluten-free formulations, adding the elasticity and structure provided by gluten in conventional baked goods. Both tapioca starch and tapioca fiber—another cassava derivative—create particularly smooth textures necessary for high-quality dairy products, sauces, and soups.

As a binder and thickener, tapioca helps retain moisture, imparts gloss, and improves spreadability. Tapioca syrup, which retains some of the fiber and minerals of the tuber, is highly hygroscopic, adding a sweet smoothness and improving shelf life. Also, at about two-thirds the sweetness of sucrose but just a little more than half the calories, it imparts a health component as well.

Tapioca fiber is primarily *isomalto-oligosaccharide* (IMO), a short-chain, resistant prebiotic fiber also known as “resistant dextrin.” It’s non-cariogenic, has a low glycemic index, and is less likely than some other fibers to cause digestive issues. Between those attributes and its versatility as a texturizing agent, tapioca can be an ideal ingredient for better-for-you foods and beverages.



Courtesy of: David Feder/Thai Trade Center-Department of International Trade Promotion



Carob fiber has proven to be an excellent texturizer that also has strong prebiotic capacity as well as blood sugar balancing ability. Credit: CarobWay, Inc.

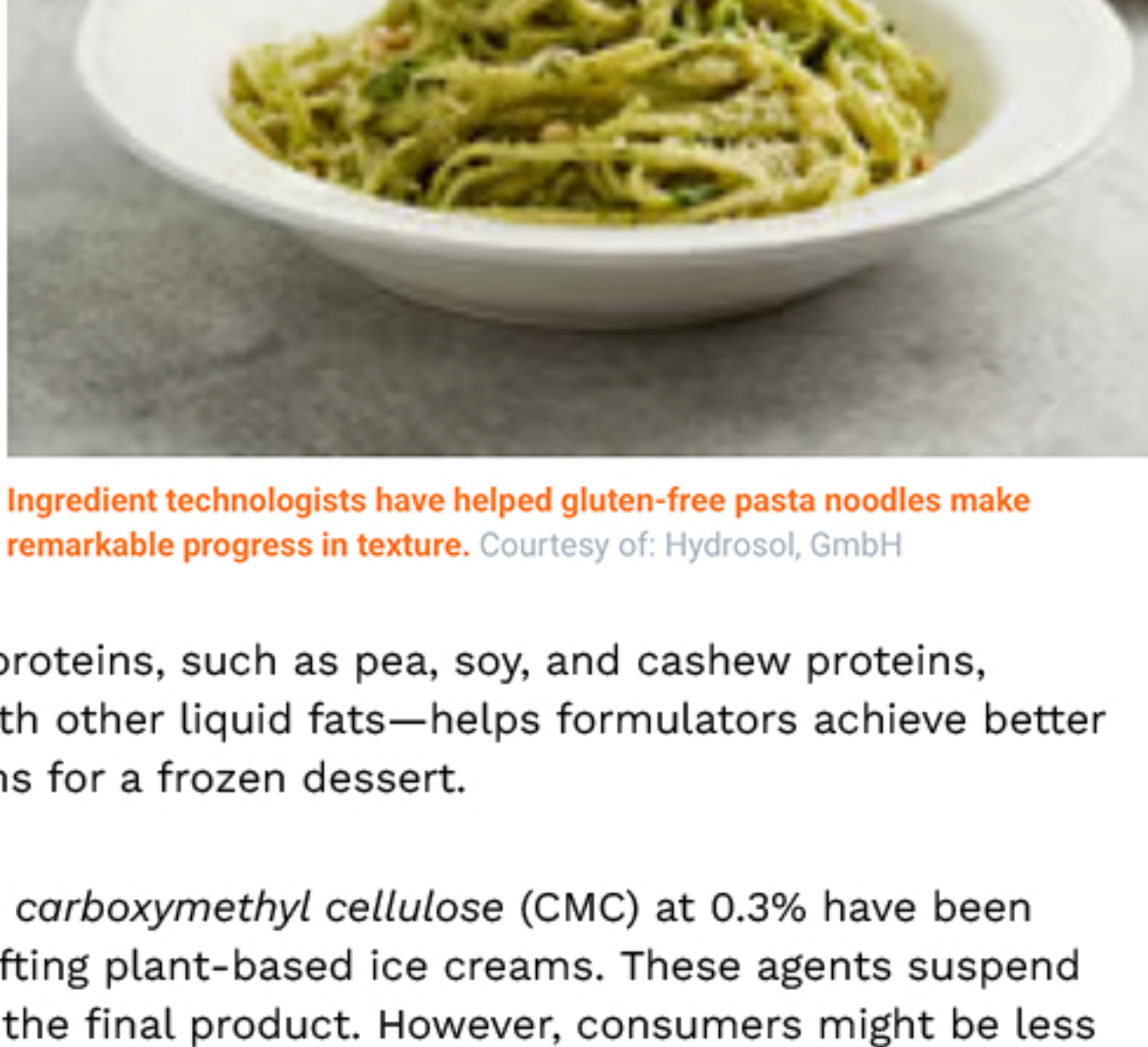
Cold Comfort

Creating plant-based analogs of ice cream presents a technical challenge. Many consumers have noted that plant-based frozen desserts actually feel colder in the mouth compared to dairy ice cream. Formulators can match solids at 34%-45% for hard pack, or 28-35% for soft serve, and with the same stabilizers and emulsifiers as used in dairy versions. However, they also can encounter organoleptic challenges if they're attempting to match the protein or fat content of dairy products.

Since the larger plant proteins are often 10 times bigger than dairy proteins, they create oddly shaped globules intertwined with residual starch. For example, adding 3.3% pea protein to a frozen dessert significantly impacts flavor and raises the mix viscosity beyond what most equipment can feasibly process. This makes it difficult to reach protein levels comparable to dairy formulations.

A systems approach is optimal. Using blended plant-based proteins, such as pea protein, and cashew and soy, combined with blended fats—typically coconut fat mixed with other liquid fats—helps formulators achieve better flavor and produce products closer to consumer expectations for a frozen dessert.

Cellulose gel, and cellulose as *microcrystalline cellulose* and *carboxymethyl cellulose* (CMC) have been shown to be among the most effective ingredients for crafting plant-based ice creams. These agents suspend solids during processing and help slow ice crystal growth in the final product. However, consumers might be less accepting of these ingredients on the label. Blends of guar gum, tara gum, and carob bean gum are also commonly employed, typically at levels of 0.1-0.3%.



Ingredient technologists have helped gluten-free pasta noodles make remarkable progress in texture. Courtesy of: Hydrocol, GmbH

Texturizer Market Value

—by MarketsandMarkets Research, Inc.

The global food texture market is projected demand USD18.8 billion by 2028, at a CAGR of 5.6% during the forecast period. This growth is largely driven by rising consumer demand for enhanced food experiences, particularly in terms of texture and mouthfeel. As consumers increasingly seek novel sensory experiences, food manufacturers are innovating with texture-modifying ingredients to meet these evolving preferences, thereby fueling market expansion.

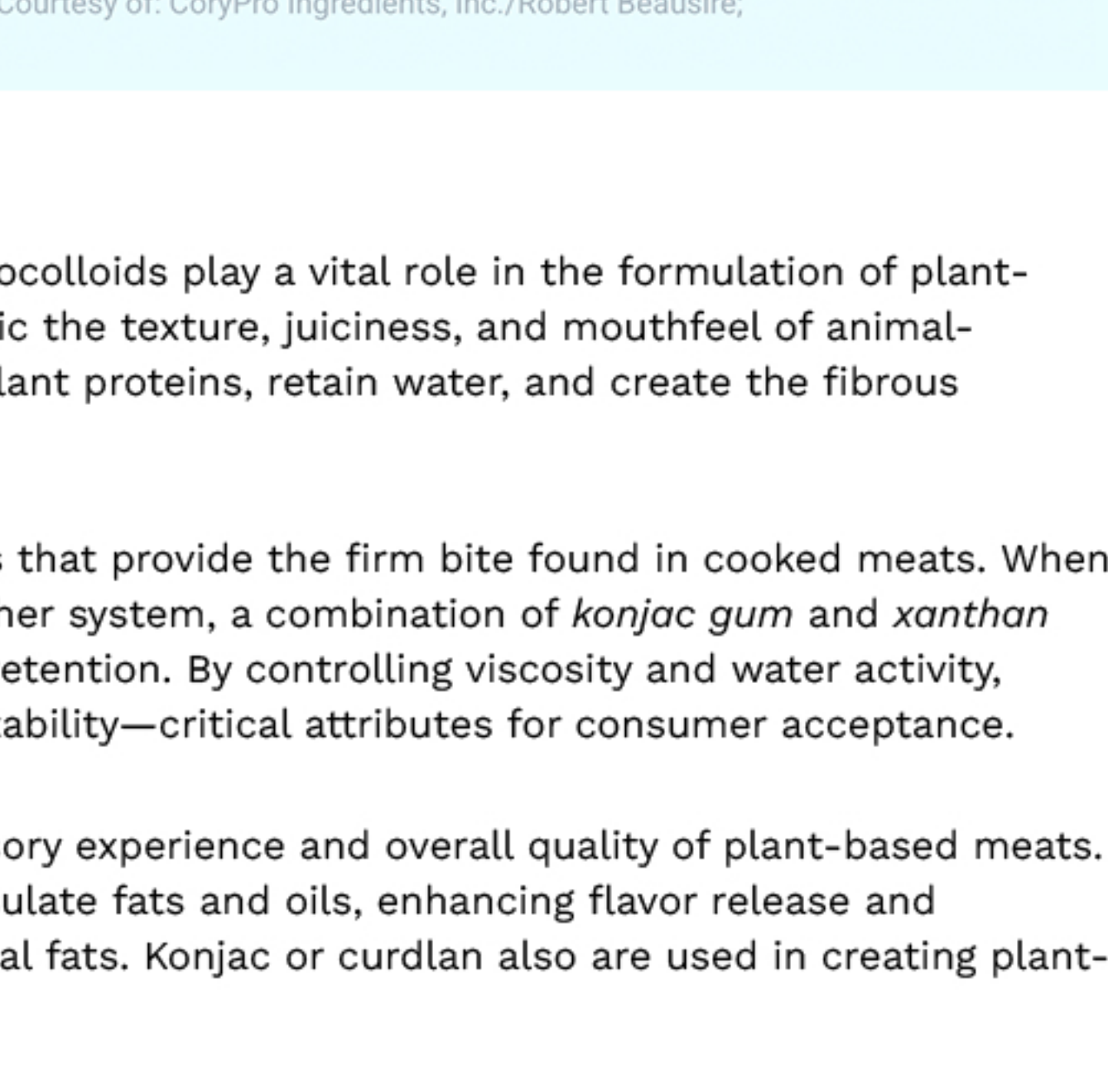
Low-pH beverages, such as protein-fortified juices and plant-based, cultured non-dairy beverages continue to gain popularity among consumers. Protein-fortified juices have a pH level well below the isoelectric point of most proteins (around pH 4.5). Unstabilized, the protein in a low-pH beverage will coagulate and sink to the bottom of the bottle. In these products, formulators have a few protein-stabilizing options to choose from. Specialty soy or pea fiber will stabilize protein in low-pH beverages and maintain a very light, refreshing mouthfeel. Pectin or CMC will also stabilize protein with a thicker, more luxurious mouthfeel. Microencapsulation is an especially popular method as well, used primarily in protein fortified clear beverages and waters. It not only confers stabilization, microencapsulation also helps with measured release and increased bioavailability.

Cultured products rely on coagulated protein for texture. Unfortunately, plant-based versions of these products often lack sufficient protein to achieve the desired structure and texture. Hydrocolloids play a significant role in these products by gelling or texturizing the water in the formulation. Pectin is one of the primary hydrocolloids in non-dairy yogurts. It is often combined with carob bean gum to help control syneresis. And tapioca starch is nearly essential to the texture that consumers expect from yogurt. (See “Better-For-You Texture,” below.)

Old Favorite Yields New ingredient

by David Feder, Executive Editor—Technical

Guar gum has been a well-respected natural texturizer in food and beverage production for many decades. Yet recently, guar protein has exhibited excellent texturization capacities, especially when it comes to plant-based analog formulation. Guar, also known as the cluster bean, is high in protein—more so than soy—averaging 40-55% or greater (dry weight). It boasts a remarkably well-balanced amino acid profile with a clean flavor and impressive satiety. Moreover, due to the firmly established guar gum market, guar protein also can present an economic advantage. As a non-GMO, highly sustainable protein source, guar protein isolates and concentrates have demonstrated potential in various food and beverage products, where their emulsification properties can be ideal for attaining desired textures.



Courtesy of: CoryPro Ingredients, Inc./Robert Beausire

Plant-based Meat

From cold cuts to sausages, from nuggets to burgers, hydrocolloids play a vital role in the formulation of plant-based meat products. Hydrocolloids help formulators mimic the texture, juiciness, and mouthfeel of animal-derived products. These functional ingredients help bind plant proteins, retain water, and create the fibrous structure characteristic of traditional meat products.

For example, 1-2% *methylcellulose* (MC) forms thermal gels that provide the firm bite found in cooked meats. When the meat cooks, the MC melts and provides juiciness. Another system, a combination of *konjac gum* and *xanthan gum*, provides a cohesive texture and enhanced moisture retention. By controlling viscosity and water activity, hydrocolloids also extend shelf life and improve cooking stability—critical attributes for consumer acceptance.

In addition to texture, hydrocolloids contribute to the sensory experience and overall quality of plant-based meats. MC and curdlan, a *beta-glucan polysaccharide*, can encapsulate fats and oils, enhancing flavor release and mouthfeel and helping to replicate the succulence of animal fats. Konjac or curdlan also are used in creating plant-based shrimp or scallop analogs.

Hydrocolloids such as *xanthan gum* also support freeze-thaw stability and reduce syneresis in refrigerated or frozen products. As consumer demand for cleaner labels and allergen-free alternatives grows, formulators are increasingly exploring multifunctional, label-friendly hydrocolloids such as citrus fiber, carrot fiber, and clean-label starches to meet both performance and transparency goals.

Neshia Zalesny, a food scientist who also holds an MBA, is a partner at IMR International, the publishers of *The Quarterly Review* and hosts of the *IMR Hydrocolloid Conference*. With more than 25 years of experience in the food hydrocolloid industry, spanning both R&D and marketing, she provides market intelligence, hydrocolloid training, and product development. You can reach her at nzalesny@hydrocolloid.com.

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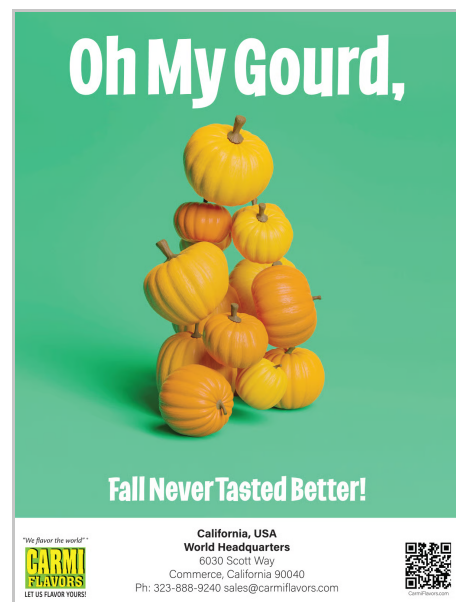
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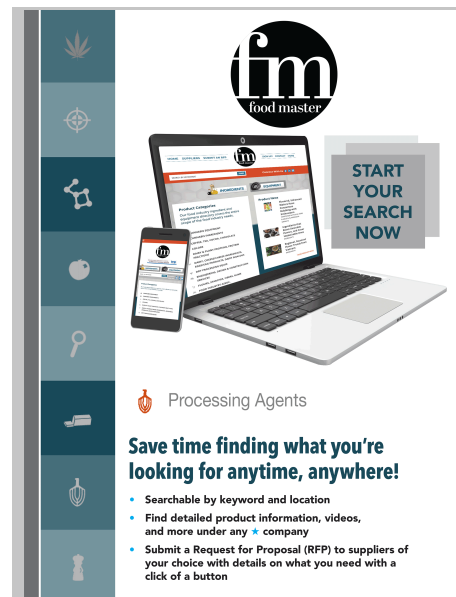
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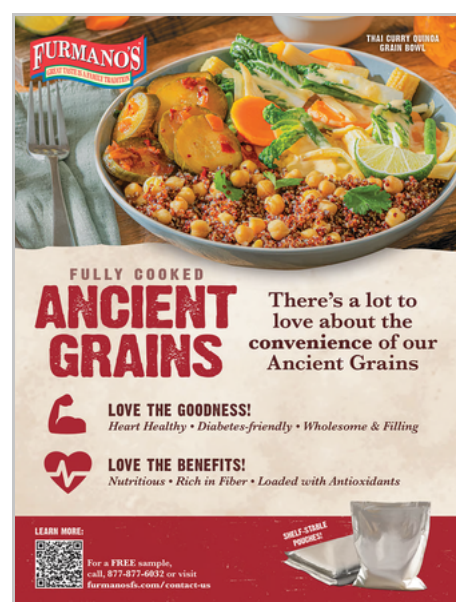
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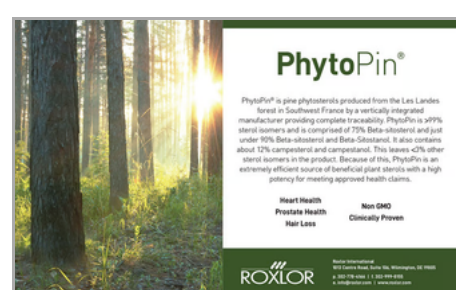
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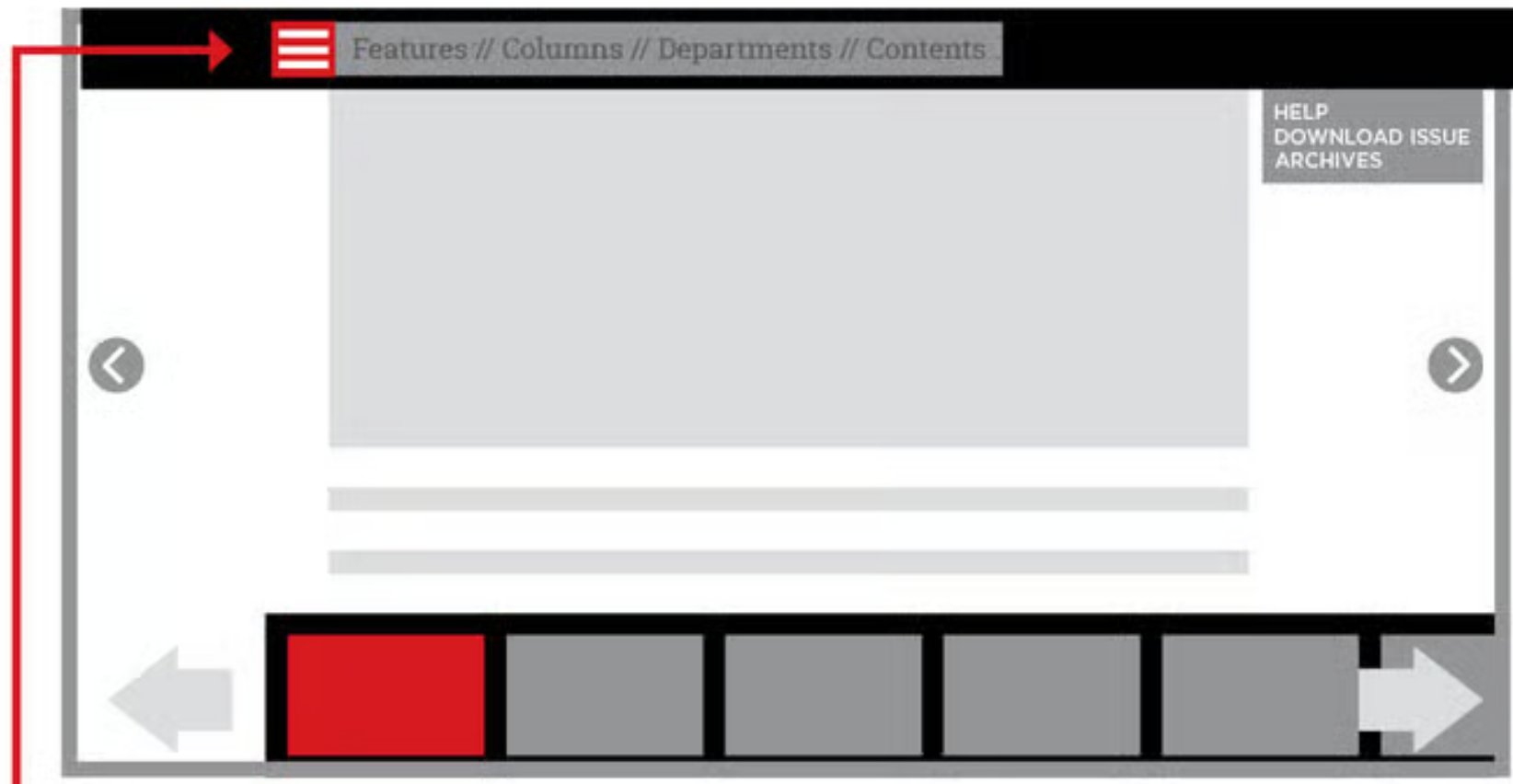
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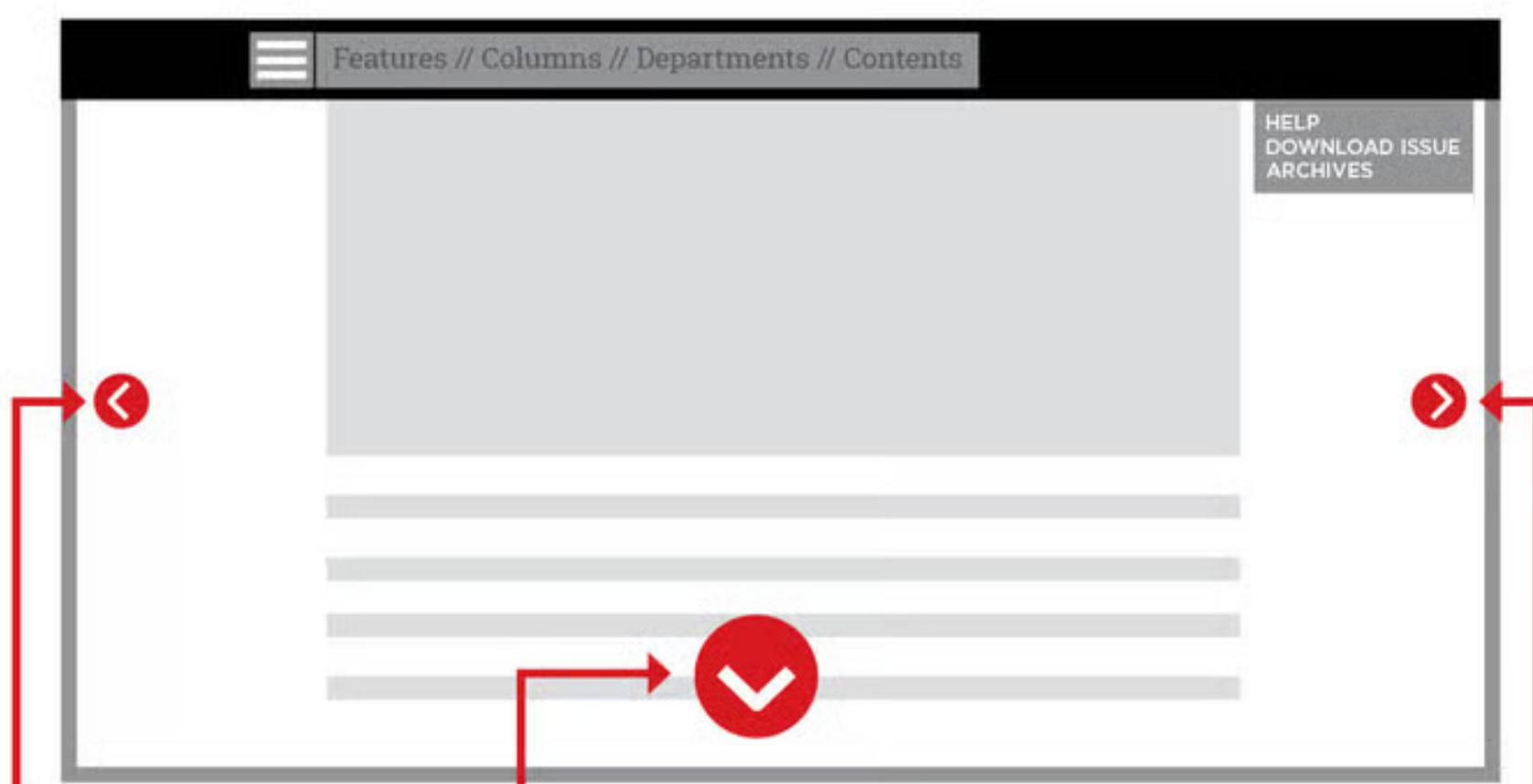


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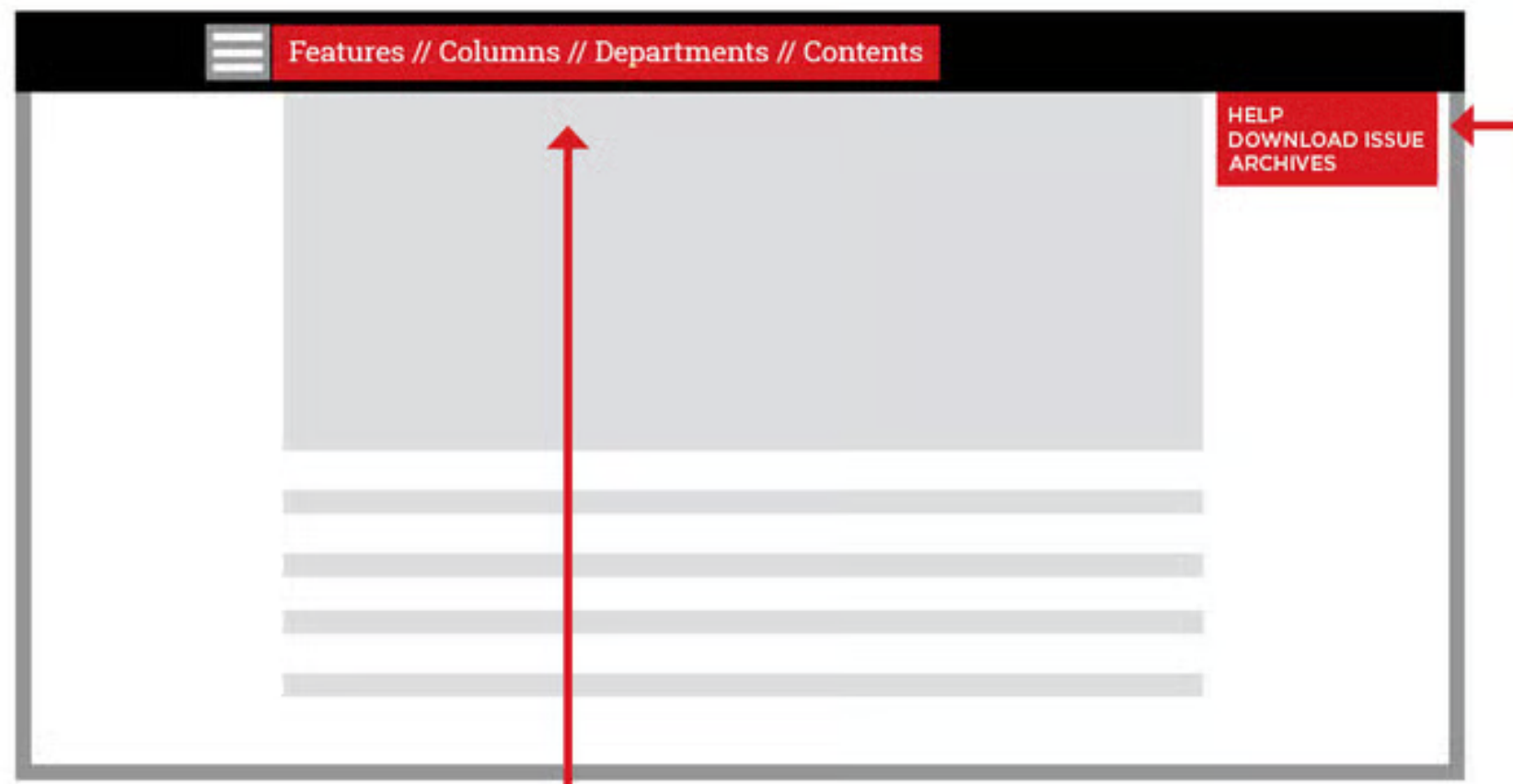


Menu brings up page tile menu at the bottom of the screen.

Page Tile Menu of all stories are displayed here. You can navigate to all stories by sliding the bar left and right. The Table of Contents is also listed here for a summary of the issue, where you can find links to each article.



Scroll down to read articles. You can also navigate between pages by clicking the **arrows** on the sides of each page.



At the top of each page is a **menu bar** that will drop down to navigate you to the features, columns, departments and Table of Contents.

To the right, or bottom of the page (tablet/mobile), a menu bar with help, download issue and archives. **Download issue** allows you to download the entire issue as a pdf for offline reading. **Archives** will take you to a listing of past issues.

Zoom

To zoom on **desktop view**, use your browser's zoom commands.

Zoom In: Control + on PC
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Zoom Out: Control - on PC
Command - on Mac

To zoom on **tablet and mobile views**, pinch your screen.

Updated 01/12/2022

