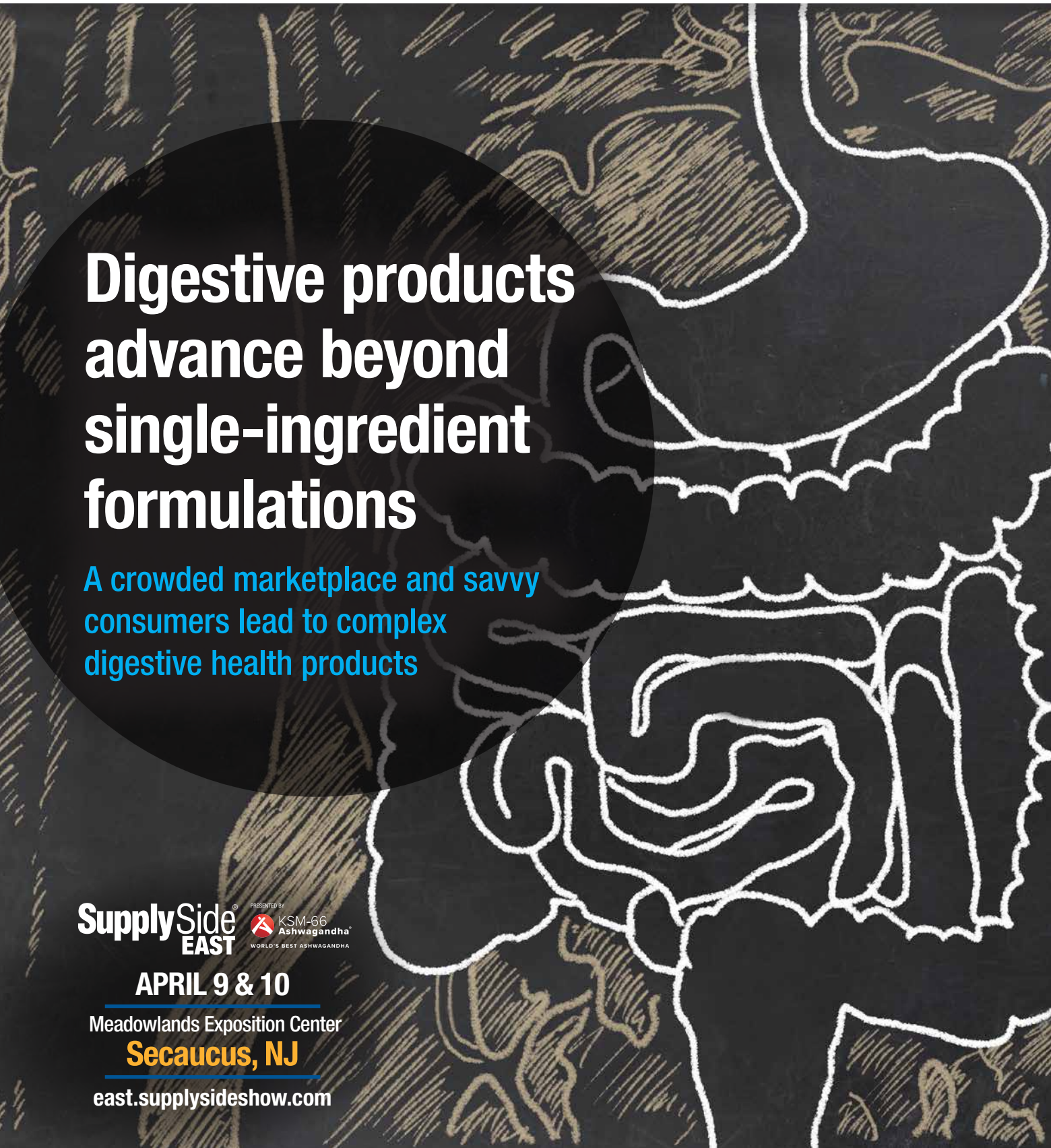
NATURAL PRODUCTS INSIDER®

Vol. 9, No. 2
March 2019
naturalproductsinsider.com
US$20.75



# Digestive products advance beyond single-ingredient formulations

## A crowded marketplace and savvy consumers lead to complex digestive health products

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Vol. 9, No. 4 March 2019



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# Gut health: It's not so scary anymore

**When I was a kid, Jamie Lee Curtis was the heroine of scary** movies like "Halloween."

When I grew up, Jamie Lee Curtis got everyone to talk about the scariest everyday health concern—the one nobody would talk about in polite company. The scourge of women who were too delicate to deign discuss digestive health.

These were the days when the only foods or supplements that could possibly serve women with digestive distress were lactose-free milk and acidophilus pills.

These were the days before gluten-free foods, and definitely long before the omnipresent pesticide glyphosate began getting implicated for tearing our gastrointestinal (GI) tracts apart.

When Jamie Lee purred that bloating, gas and everyday cramps might be solved through the magic of yogurt-laden probiotics, this indeed was a new thing.

Probiotics. Now that's a word with brand equity—better even than antioxidants in the annals of nutrition nomenclature. Maybe even better than omega-3s. Somehow more life-affirming than antibiotics. Pro means positive. Biotics sounds like life.

We've found the No. 1 nutritional ingredient for optimal living.

The friendly bacteria started off with the promise of helping with digestive health.

By the time FDA sanctioned Dannon for US$21 million for making illegal disease claims about its probiotics, the cat was already out of the bag, and word of probiotics as a miracle ingredient was out.

As research marched on, a multitude of probiotic species and specific strains have been studied, and the probiotic benefit traveled from its origins in digestive health to immune health (70 percent of the body's innate immune function lies within the GI tract). Now, researchers are identifying a range of provocative health benefits where probiotics might exert effects. There is talk of a gut-brain axis, and specific bacterial strains are being studied for everything from weight management to hair loss.

The entire body's microbiome is being mapped, and early reports are discovering that there are perhaps 10 or 100 times the number of bacterial cells in the body than there are human cells—making it an open question as to just what it is we're made of and who's really calling the shots in human physiology.

Prebiotics—the fiber lunch box for probiotics—have now won praise for the power they have, and product developers are now formulating with the combination of probiotics and prebiotics: synbiotics.

And to think that all it took was for us to get over our fears of talking about uncomfortable digestion issues.

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# NUTRITION GETS *Personal*

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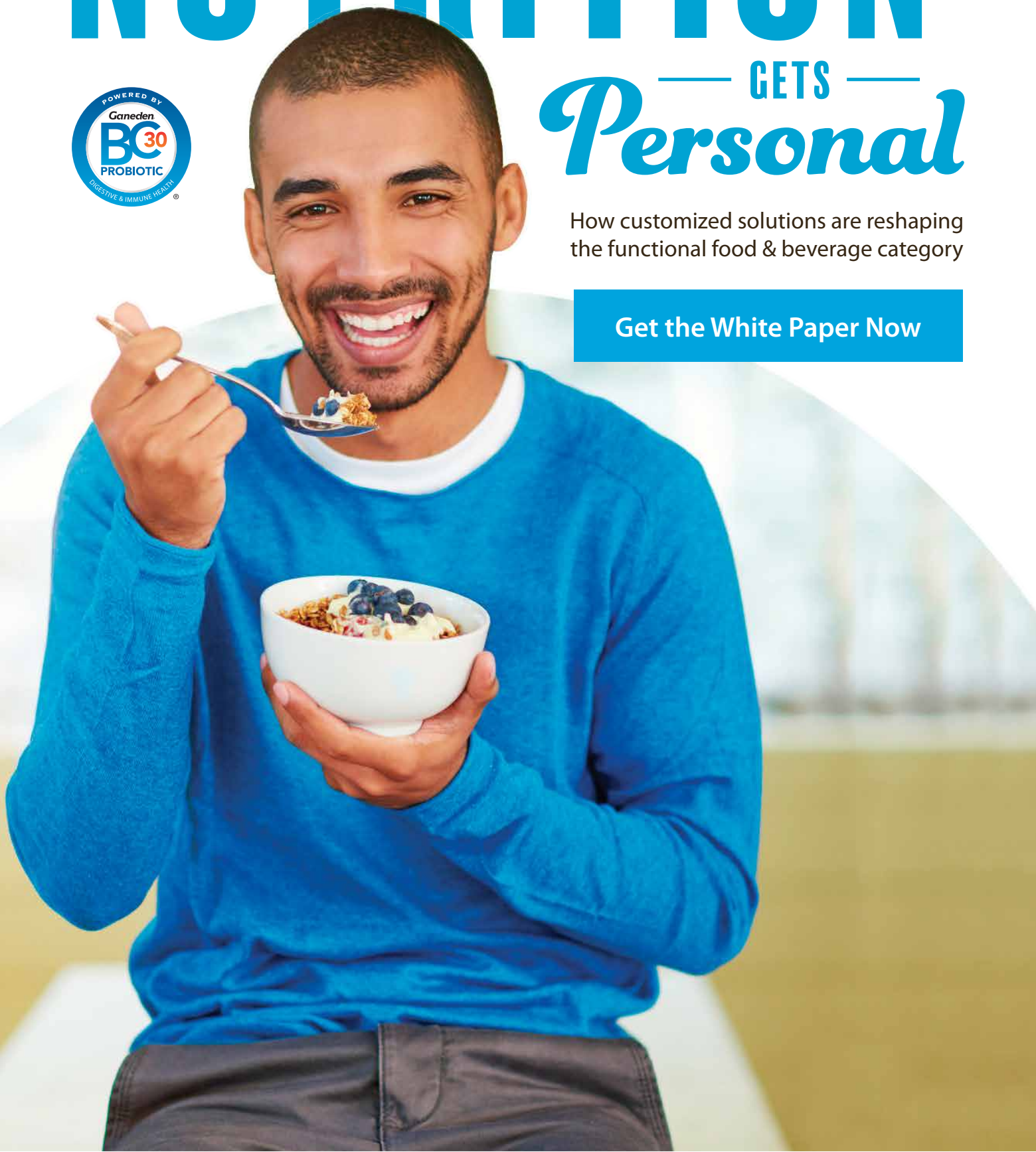

# The importance of healthy bacteria in the infant gut microbiome

by Tracy Shafizadeh, Ph.D.

**INSIDER's Take**

- The infant gut microbiome established during the first months of life helps determine health throughout a person's life.
- *Bifidobacterium infantis* can convert human milk oligosaccharides into short-chain fatty acids, which benefit infant health.
- Babies supplemented with B. infantis had fewer pathogenic bacteria in their guts compared to breastfed controls.

**Digestive health for infants in their first few months of life centers on fostering** the proper conditions in which an infant can grow and develop. The infant diet may appear simple, consisting only of breast milk and/or infant formula, both of which provide complete nutrition for an infant, but many additional factors allow infants to receive the building blocks they need to develop and grow.

The gut microbiome, for example, plays an active role in human immune function,[1] metabolism[2] and neurological processes,[3] and the composition of the gut microbiota is a factor in overall health.[4] This is particularly significant for the infant gut microbiome, as it is directly involved in early immune programming and metabolic function.[5]

Infants inherit the organisms that comprise their microbiome initially at birth, and the makeup can differ dramatically depending on birth mode and infant diet.[6,7] Vaginally delivered infants are exposed to their mother's vaginal and colonic microbes, allowing for rapid colonization of Bifidobacterium and bacteroides when breastmilk is introduced. Alternatively, infants delivered by C-section are not exposed to these maternal microbes and are instead rapidly colonized with bacteria commonly found on the skin and in the environment, such as Escherichia, Staphylococcus, Streptococcus and Clostridium. This C-section-associated gut dysbiosis has been linked to both acute and chronic disorders, such as colic, eczema, asthma, allergy, obesity and type 1 diabetes.[8]

**Colostrum** is the first type of milk a mother produces, and is high in both protein and antibodies, providing passive immunity to an infant during its first moments of life.

The composition of breast milk is not static; its consistency evolves throughout a mother's time breastfeeding. Colostrum, for example, is the first type of milk a mother produces, and is high in both protein and antibodies, providing passive immunity to an infant during its first moments of life. Breast milk also plays a critical role in the development of a healthy gut microbiome.[9]

Breast milk contains complex carbohydrates, human milk oligosaccharides (HMOs), which are indigestible by the infant and instead serve as food for gut microbes. Alternatively, infant formula does not provide an equivalent food for the gut microbiota, and therefore does not support the colonization of known protective gut microbes found in the breastfed infant.[10]

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The key to this milk-microbe interaction is that not all bacteria can utilize HMOs equally. HMOs are preferentially consumed by specific strains of bacteria, such as B. infantis, a type of beneficial bacteria traditionally found in healthy, breastfed infants. B. infantis can convert these indigestible carbohydrates into short-chain fatty acids, which are nutrients the infant can use. In the scientific literature, intestinal short-chain fatty acids have been shown to have multiple health benefits to an infant, including lowering intestinal pH, improving gut barrier function and serving as energy-signaling molecules during growth and development.[11] The conversion of carbohydrates additionally allows for maximum nutrient utilization from milk, as these valuable HMOs are excreted in the stool if B. infantis is not present in the baby's gut to digest them. Also, when these beneficial bacteria are missing, other, potentially harmful bacteria can partially utilize these milk oligosaccharides for growth in the infant gut.

**When B. infantis colonizes the infant gut during the first months of life, dramatic beneficial effects are observed in both the microbiome composition as well as intestinal biochemistry.**

An infant gut microbiome colonized by B. infantis and fed by human breast milk will flourish and minimize the growth of pathogenic bacteria. In a recent clinical trial, supplementation with B. infantis EVC001 (commercially available as Evivo®, from Evolve BioSystems) significantly increased the levels of this important gut bacteria in term, breastfed infants.[12] Additionally, the infants receiving B. infantis along with breastmilk showed a 93 percent reduction in potentially pathogenic bacteria, along with an 85 percent reduction in pathogen-associated virulence factors, compared to breastfed controls.[13]

For most infants born without this important bacteria, colonization of B. infantis through probiotic supplementation is now possible, creating a protective intestinal environment, reducing the abundance and virulence of pathogenic bacteria and maximizing the utilization of breastmilk nutrients.

When B. infantis colonizes the infant gut during the first months of life, dramatic beneficial effects are observed in both the microbiome composition as well as intestinal biochemistry. Since B. infantis is uniquely adapted to metabolize HMO, it prevents the loss of this breastmilk component otherwise lost through fecal excretion. A clinical study found that breastfed infants who were colonized with B. infantis showed a 10-fold reduction in fecal excretion of HMO compared to breastfed infants who were lacking B. infantis.[14]

This reduction in HMO excretion was further associated with improved infant stool. In infants where B. infantis colonized the microbiome, there were significantly fewer loose, watery stools compared to control infants.[15] The metabolism of HMO by B. infantis in the infant gut leads to a production of lactate and acetate, which serve as fuel for the colonocytes as well as reduce the pH of the intestinal environment, inhibiting growth of potential gut pathogens such as *Escherichia coli* and *Clostridium difficile*.

## Significance of HMOs in infant digestive health

The symbiotic relationship between HMOs in breast milk and B. infantis is of great significance when talking about optimizing infant nutrition and health. Historically, breast milk was the only source of nutrition for a developing infant, so the composition of breast milk is optimized for providing complete nutrition for both the infant and the infant gut microbiome. The fact that HMOs, abundant in breast milk, are wasted and excreted without the presence of B. infantis demonstrates the importance of these beneficial bacteria. These beneficial bacteria protect the infant microbiome from potentially harmful pathogens, allowing for optimal intestinal development before additional food sources beyond breast milk are introduced.

*Tracy Shafizadeh, Ph.D., director, scientific communications, Evolve BioSystems, is a nutritional scientist and mom of two boys. She has more than 15 years of research experience in precision medicine and diagnostic development, specifically focused on the role of nutrition and metabolism in cardio-metabolic diseases. Prior to joining Evolve, she led both product development and scientific communications roles at numerous start-up life science companies. Shafizadeh received her doctorate degree in nutritional biology from University of California, Davis, studying intestinal development and folate metabolism in newborns.*

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# Formulating combination digestive health products

by Rachel Adams

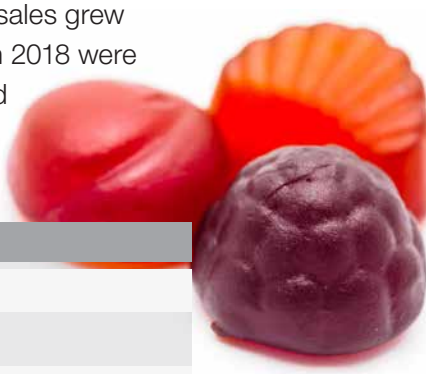
**INSIDER's take**

- Synbiotic supplement sales reached US$5.66 billion in 2017, representing 19 percent growth from 2016.
- Careful formulation is critical when developing synbiotic or combination digestive health products.
- Ensuring products are effective throughout shelf life is key to ensuring benefits are realized.

**In recent years, probiotics have been the champion of the digestive health** category, valued at US$46.5 billion in 2017 and expected to grow at a compound annual growth rate (CAGR) of 7.5 percent through 2023, according to Mordor Intelligence. Probiotics are the healthy bacteria of the gut microbiome attributed with benefits to digestive health and, increasingly, to the brain and immunity, among other benefits.

Prebiotics are substances naturally present in food that are not absorbed in the gastrointestinal (GI) tract. They arrive intact in the colon and stimulate the growth of the probiotics.

Interest in prebiotics is escalating rapidly, as indicated by recent market activity. According to *Nutrition Business Journal* (*NBJ*) data, prebiotic supplement sales grew 130.4 percent in 2017 to $41.4 million, up from $18 million in 2016. Sales in 2018 were estimated at $96.1 million, representing growth of 132.2 percent compared to 2017, and will amount to an estimated $3.98 billion by 2020.



## Prebiotic supplement sales growth

| Year | Sales |
|---|---|
| 2016 | $18 million |
| 2017 | $41.4 million |
| 2018 | $96.1 million |
| 2020 | estimated $3.98 billion |

*Source: Nutrition Business Journal*

When combined, probiotics and prebiotics work in tandem to support a healthy gut microbiome.

The combination is known as synbiotics—another large and growing digestive health product category. *NBJ* data showed synbiotic supplement sales reached $5.66 billion in 2017, representing 19 percent growth from 2016. Synbiotic supplements are projected to achieve $8.81 billion in sales in 2020.

Interestingly, growth of the synbiotics market is anticipated to outpace that of the probiotics market, representing a CAGR of 9.8 percent from 2018 to 2023 compared to a CAGR of 7.5 percent for probiotics, as indicated by Mordor Intelligence.

Health-conscious consumers are among factors driving interest in combination products like synbiotics, as well as other combination digestive health products.

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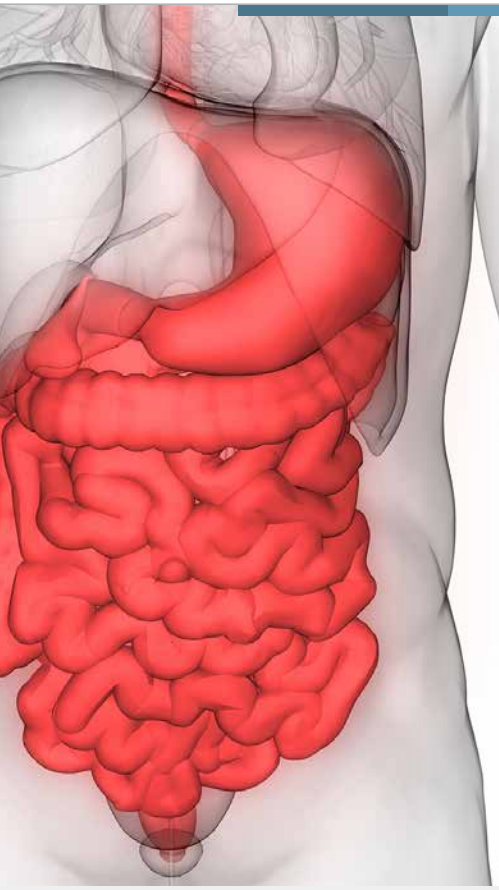

"Today, consumer awareness of gut health has moved beyond probiotics to encompass prebiotics and enzymes as digestive health promoters, driving combination digestive health products and innovative delivery systems," said Shaheen Majeed, president worldwide, Sabinsa.

A crowded market could be another force pushing combination digestive health products ahead.

"As the market matures, the biggest challenge for product manufacturers is differentiating their probiotics from others to reignite growth," said Cashtyn Lovan, senior marketing associate for EpiCor®, Cargill Health Technologies. "For a while, increasing CFU (colony forming units) counts and formulating with multiple strains have helped with differentiation, but consumers are always looking for new, better ways to support their health. Savvy product manufacturers are taking advantage of the growing consumer knowledge of the gut microbiome and formulating probiotics with ingredients that beneficially modulate the bacteria already in the body."

**Products that offer a combination of probiotics, prebiotics and/or digestive enzymes can pose challenges related to formulation, quality and efficacy.**

Products that offer a combination of probiotics, prebiotics and/or digestive enzymes can appease consumers looking for products to improve gut health, but such products can pose challenges related to formulation, quality and efficacy.

Developers looking to create combination digestive health products must carefully consider formulation, dose and shelf life requirements to ensure products not only appeal to consumers but provide them with functional benefits that help them achieve desired health goals.

## Synergy and stipulations

The goal of incorporating different digestive health ingredients into one product is to produce synergistic effects that can increase the efficacy of the products or to provide more targeted solutions.

"For instance, adding a prebiotic to a probiotic product can help act as a 'fertilizer' and aid in the growth and proliferation of the probiotic," explained Samantha Ford, business development director at AIDP, pointing to research showing a combination of green kiwi

powder with prebiotic and enzyme activity (as Actazin™, from AIDP) fueled growth of the probiotic *Lactobacillus rhamnosus* HN001 by as much as 140 percent.[1]

Anke Sentko, vice president regulatory affairs and nutrition communication, BENEO, offered similar sentiments.

"If prebiotics and probiotics are in the same food, they deliver their benefits independent from each other (following the [rationale of] 1+1=2)," she said. "It might, however, also be possible that a prebiotic present together with a specific probiotic strain will provide a synergistic effect, e.g., by ensuring or extending the shelf life of the probiotic, leading to a [rationale of] of '1+1=3.' Research related to this needs to be strain-specific."

The term used to describe the combination of probiotics and prebiotics working synergistically—synbiotics—was first coined by researchers in 1995,[2] said Janaki Lyer, lead research scientist at KGK Science. Today, ample research supports the benefits of pre- and probiotic combinations.

Offering targeted benefits for weight management is a combination of *Bacillus lactis* B420™ and Litesse® Ultra™ polydextrose (as HOWARU® Shape, from DuPont Nutrition & Health). The prebiotic/probiotic combination helped subjects control body fat mass, trunk fat mass and waist circumference, and reduce energy intake in overweight adults.[3]

Combining the benefits of a multi-enzyme blend and *Bacillus coagulans* MTCC (LactoSpore®, from Sabinsa) is Sabinsa's DigeZyme®. The combination has been clinically evaluated for its role in alleviating functional dyspepsia[4] and delayed onset muscle soreness from exercise.[5] Other synbiotic ingredients from Sabinsa include LactoWise®, a proprietary blend of LactoSpore and a natural soluble fiber fraction from Fenugreek seed (Fenumannans®), and LactoCran™, a combination of LactoSpore and cranberry seed powder (as a prebiotic).

"Synbiotic preparations, thought by some to be more beneficial than taking only probiotic or prebiotic, have been moving into the functional food space," Majeed said. But, he added, "Careful formulation is key."

In other words, there are stipulations to achieve the synergistic benefits of combination products.

"There is no magic bullet," said Kimmo Lucas, CEO, Top Health Ingredients Inc. "Incorporating a blend of probiotics and prebiotics into a healthy diet is essential; however, unlike probiotics, which often don't survive in the system beyond the stomach, prebiotics arrive in the gut undigested—hence, available to be utilized by good intestinal bacteria."

As living organisms, probiotics require special consideration to ensure they remain viable through manufacturing, storage, transit, shelf life and digestion, so benefits are realized.

"Keeping the probiotic bacteria alive is the greatest challenge when considering a product formulation containing probiotics," said Jenna Nelson, senior marketing manager, UAS Labs. "Probiotic bacteria are living things, and if they are not given a proper diet, suitable environmental conditions or stored under the right conditions, they become injured or die, reducing their efficacy." She advised tailored manufacturing and packaging procedures be implemented for probiotic-containing products.

This can be a challenge when paired with ingredients such as enzymes, which need exposure to food in the stomach to be effective.

"It is well-known that digestive enzymes should become available to substrates (food) in the stomach," explained John Davidson, director of innovation and education, Deerland Probiotics & Enzymes. "However, it is also well known that lactic acid bacteria, such as the common Lactobacillus and Bifidobacterium probiotics, should be protected in the stomach and delivered further down the digestive tract. This naturally creates a major challenge when formulating combination products, specifically when choosing both the formula delivery system, along with the raw material choices themselves."

One solution is choosing an appropriate capsule.

"Vegetable capsules have faster dissolution rates, which is a better scenario for enzymes, while delayed-release capsules are often designed to digest slower in acidic conditions like the stomach, which is better for probiotics," he said. "So, determining how to formulate a product that can accommodate both needs is crucial for the development of a successful combination supplement." He recommended implementing formulation choices such as cap-in-cap technology and gastric-stable coated raw materials.

**"For those formulating with probiotics, survival of the bacteria is key, and moisture in the supplement is detrimental to survival."**

— Cashtyn Lovan, senior marketing associate for EpiCor®, Cargill Health Technologies.

Another solution, he said, is utilizing "hardier" probiotics, such as spore-forming probiotics, "because they are much more likely to survive gastric conditions, regardless of delivery system."

Additionally, according to Ford, combining with certain enzymes or other ingredients can destroy certain probiotics.

For this reason—and others—ingredient compatibility is critical when formulating a combination product.

"For those formulating with probiotics, survival of the bacteria is key, and moisture in the supplement is detrimental to survival," Lovan said. "That means low water activity (the level of moisture) of any combination ingredient is an essential consideration."

This includes, according to Davidson, ingredients such as standardizing agents and botanicals that can impact shelf life and "must be looked at with scrutiny, [i.e.,] how much free water, which negatively impacts efficacy over shelf life, is being introduced by these other ingredients?"

"Selecting a suitable prebiotic to promote growth of a selected strain of probiotic is very important," Majeed advised. "Both the selected probiotic and prebiotic must help

each other to achieve their functionality. Stability is another major consideration in selection of strain, determination of manufacturing process, and in the choice of packaging material."

Overages of live bacteria are often added to probiotic products to ensure the products contain the labeled amount of live bacteria throughout shelf life and, thus, retain efficacy.

"Calculating appropriate overages to ensure effective dosages in the end product for products of limited stability is another important factor," Majeed explained.

Davidson advised the decisions around how much overage to utilize per ingredient to achieve shelf life efficacy through consumption is driven by formulation, water activity management, storage/transport conditions and packaging choices/design.

Prebiotics, unlike probiotics, "are advantageous because they are not live organisms—they are generally nondigestible carbohydrates that stimulate the growth of the body's own good bacteria," Ford said. "Prebiotics are not affected by heat, cold, acid or time."

That's not to say prebiotics are without challenges.

"The challenge is that prebiotic fibers, which are known to feed beneficial bacteria in the gut, have very large efficacious amounts, making it hard to formulate into capsules, tablets or gummies," Lovan said, adding EpiCor, a yeast fermentate, has been shown to shift the gut microbiome at a low daily dose of 500 mg.[6]

## Ensuring efficacy

Formulation is critical to ensure combination digestive health products remain effective throughout shelf life and in the gut. But, according to Davidsion, "perhaps the most important way to ensure combination products meet efficacy over expiry is by simply having a stability monitoring procedure and protocol in place to test the products.

"So many times, expiration dates are put on custom-designed products with the intent that the shelf life is determined by the sum of the raw material stability data, or under the assumption that the customer will manage stability … this is simply not enough," he said. "Someone, somewhere, must be testing and monitoring the product's activity and microbiological safety in real-time over the course of that expiration period, and that information must be available for auditing purposes."

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# MICROBIOME, MACROPOWERFUL

Research over the past two decades has revealed that gut health is critical to overall wellness and immunity, and that an unhealthy gut contributes to a wide range of health challenges. Many researchers believe that supporting digestive health and restoring the integrity of the gut barrier will be one of the most important goals of health professionals in the 21st century.

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# Digesting the latest in digestive product types

by Connor Lovejoy

INSIDER's take

- Humans digest roughly 50 tons of food (100,000 lbs.) in their lifetime.
- Manufacturers and brands in the digestive health space are focusing on ingredient advancement, delivery technology, formulation and expertise.
- Some manufacturers are attempting to find more effective products by combining various sources into one.

**Probiotics and prebiotics. In the world of digestive health, both probiotics and** prebiotics spearhead the industry. Probiotics are live bacteria that are good for the digestive system.[1] Historically, the word "bacteria" gets a bad wrap because it stirs up images of sickness and disease. But probiotics are bacteria that improve and restore the gut flora. Prebiotics, on the other hand, lend a helping hand.

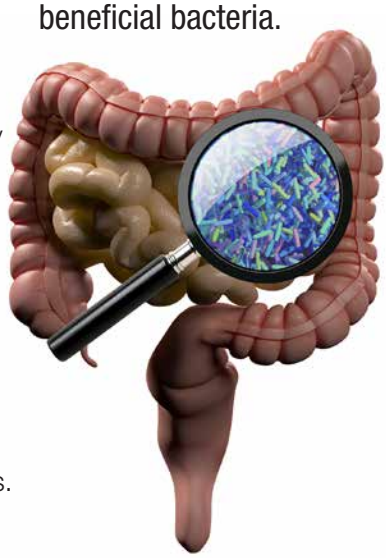
Humans digest roughly 50 tons of food (100,000 lbs.) in their lifetime. The 100 trillion microbes in each person's gut play a key role in digestion, and prebiotics play a major role in generating beneficial bacteria.[2]

"I think of prebiotics as 'fertilizer' for the healthy bacteria in your microbiome," stated Kimmo Lucas, CEO, Top Health Ingredients Inc. "They're essentially feeding the beneficial bacteria that help build and support a healthy, functioning gut."

Vinti Goel, Ph.D. director of scientific and regulatory affairs, BioNeutra North America Inc., stated, "Remarkable research on the gut-brain axis suggests the gut is our second brain, so to speak, controlling much of our body including the immune system—our disease-fighting unit. The gut also plays a key role in our mood by producing serotonin—the chemical responsible for positive mood. With millions of North Americans suffering some kind of digestive disorder, the interest in prebiotics is mounting."

Manufacturers and brands in the digestive health space are increasingly pushing the envelope in terms of ingredient advancement, delivery technology, formulation, expertise and more. The category has also widened as demand for products spans beyond a single probiotic strain or fiber source into combination products, as well as those containing digestive enzymes and various forms of prebiotics.

**The 100 trillion microbes in each person's gut** play a key role in digestion, and prebiotics play a major role in generating beneficial bacteria.



## Serving delivery innovation

With consumers expecting manufacturers to be flexible in terms of delivery systems, manufacturers offer consumers numerous delivery forms. BioNeutra, a Canadian agri-biotechnology manufacturer, offers VitaFiber™

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IMO—a low-calorie natural sweetener and prebiotic produced from tapioca or pea starch. What differentiates VitaFiber from other prebiotic delivery is its ability to be both a powder and a syrup.

"The ability to provide a prebiotic effect is one of the most important aspects of many new products in the market, and not just in the traditional food arena," said Warren Michaels, vice president of communications, BioNeutra. "Mainstream consumers are now looking for those products that provide the right health benefits (such as lower caloric content, a prebiotic effect, overall digestive health, etc.) Ultimately, though, the products have to taste good, and that's not going to change anytime soon."

VitaFiber's flexibility has allowed it to be put in protein bars, beverages, ice cream, yogurts and confectionaries.

Even when it comes to standard delivery forms such as capsules, tablets and softgels, manufacturers are figuring out how to improve delivery.

Ginger's (*Zingiber officinale*) presence in the diet can be traced back more than 5,000 years. It's also been widely used in Ayurvedic and Eastern medicine. OmniActive Heath Technologies offers Gingever, a high-potency ginger that contains 30 percent bioactives and a minimum of 25 percent gingerols. Consumers looking for ginger in a manageable dose might be in for a surprise.

"Getting beneficial amounts of ginger usually means taking multiple large pills," stated Brian Appell, marketing manager, OmniActive. "Who wants to take all of those, especially when feeling queasy? Gingever delivers beneficial levels of high-potency ginger extract in one pill. Just 60 mg of Gingever is equivalent to 1,000 mg of ginger root powder," he said. Gingever's ability to deliver more in a smaller package boils down to OmniActive's use of supercritical $CO_2$ extraction technology to concentrate the active compounds from ginger without the use of harsh solvents. This form of extraction allows the richest source of ginger's polyphenols in a composition that is closest to what is found naturally in roots.

## Two is better than one

Some manufacturers are attempting to find more effective products by combining various sources into one. One such company taking strides in that respect is Taiyo Intl. They offer a prebiotic called Sunfiber that is a soluble fiber low in fermentable oligosaccharides, disaccharides, monosaccharides and polyols (FODMAPs). Certain consumers looking to decrease their FODMAPs intake hope to improve irritable bowel syndrome (IBS) symptoms such as gas, bloating and abdominal pain.

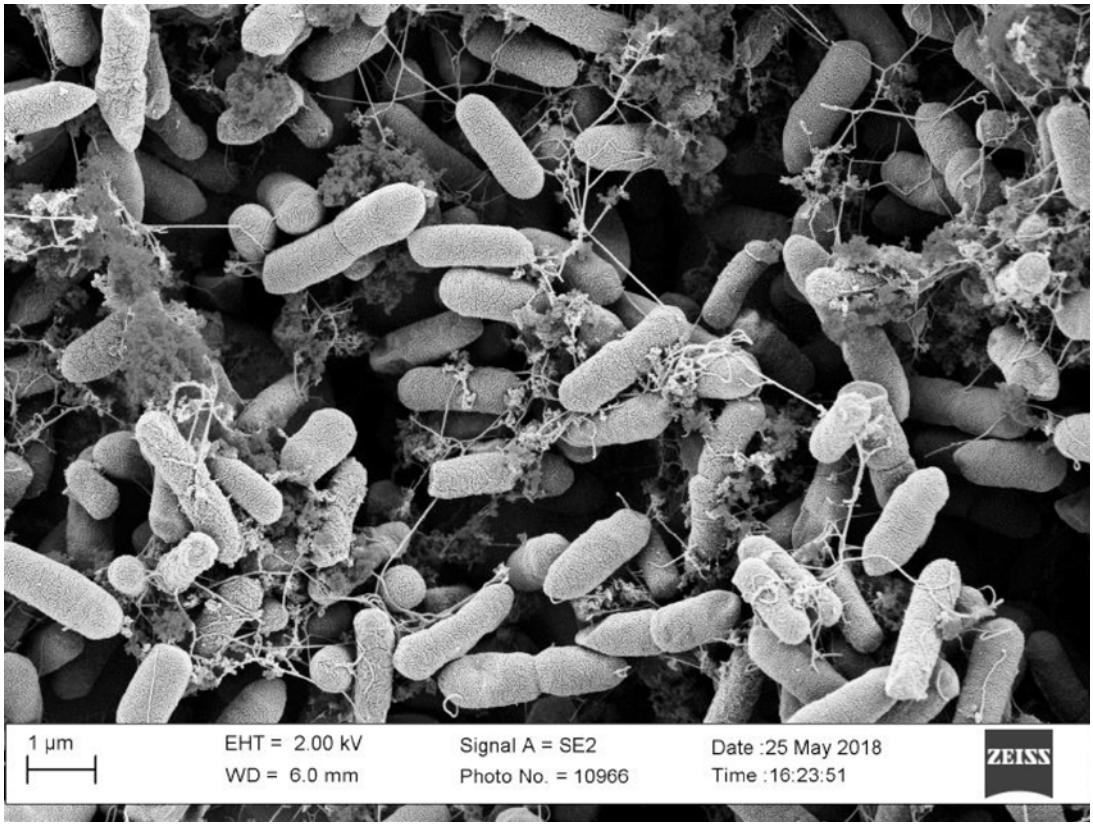
"Another new product for us is our SunCran Naturelle, which combines Sunfiber with organic cranberry juice to form a vibrant red powder to help promote gut and urinary tract health," said Derek Timm, technical sales director, Taiyo. "This dual-action product is an interesting concept because Sunfiber has prebiotic benefits in the gut. This is important because the

gut bacteria are the source of bacteria that cause urinary tract infections. SunCran Naturelle also causes the urine to have anti-adhesion activity due to the proanthocyanins (PACs) in cranberry binding to pathogenic E. coli.

## Staying ahead of the game

One of the reasons BioNeutra's VitaFiber stands out from the crowd is its soluble fibers. "A large portion of the fiber market are the insoluble fibers that do not break down in the colon and do not provide a prebiotic effect. They essentially just 'move things along.'[3] Some soluble fibers create a very strong prebiotic effect, but the body has a difficult time tolerating them due to various effects such as gas creation or excess laxation.

In a recent unpublished study, Rutgers University examined Taiyo's SunCran Naturelle ingredient's anti-adhesion effects. Twenty healthy subjects received 1 g of SunCran Naturelle and then provided urine samples for 24 hours. The urine was then treated with pathogenic E. coli that causes urinary tract infections, testing to see if the cranberry PACs would bind them together. This binding resulted in the E. coli not being able to adhere to the urinary tract and cause an infection. This is the accepted mechanism of action for cranberry helping with urinary tract health.




Even though probiotics are an established part of the digestive health industry, some suppliers are spending a great amount of time further researching the benefits and actions of probiotics.

Research conducted by Morinaga Milk Industry Co. on bifidobacteria showed promise.[4] The research showed bifidobacteria naturally resides in the human intestine, especially in infants. Such bacteria are called human residential bifidobacteria (HRB). The research also discovered only HRB species are capable of certain functions. Unlike Non-HRB species, HRB species are particularly effective at utilizing the human milk oligosaccharides (HMOs) in breast milk; the species can also tolerate lysozyme, an "antibacterial factor."

**Consumer demand for more digestive health options isn't going away any time soon.**

These characteristics allow HRB species to colonize the infant gut, contributing to the development and maturation of a healthy microbiome. These findings show HRB species are suitable for consumption by adults and infants.

Consumer demand for more digestive health options isn't going away any time soon. Manufacturers and suppliers are not only specializing in prebiotic and probiotic ingredients, but a combination of the two that checks more than one box for consumers. Brands are coming to the realization that consumer focus on digestive health means limitless applications in the food and beverage space.

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SCIENCE IS OUR NATURE

# 5 ingredients driving the booming digestive health category

by Todd Runestad

**INSIDER's take**

- Digestive health solutions have tripled in size in the last decade.
- Category leader probiotics is evolving with strain-specific health benefits, while prebiotics are becoming recognized as a significant sector.
- File under: Rising tide lifts all boats—research is validating new uses for older ingredients.

**The digestive health category continues to thrive, no thanks to people's busy** schedules, poor eating habits, high-stress lifestyles and Big Ag's use of gut-busting pesticides like glyphosate that is being shown to change gut microbiota abundance and composition and perhaps lead to celiac disease and gluten intolerance.

The digestive health category has nearly tripled in size in the last decade to reach US$2.96 billion in 2018, with sales predicted to reach $3.9 billion by 2021, according to *Nutrition Business Journal*.

Several botanicals have a traditional history of use supporting gut health, like peppermint, ginger and dandelion. And the bitters category of dietary supplements has gained steam in the last year or two. These are herbal tinctures that can enhance the entire process of digestion, absorption and elimination. Their sudden popularity is indicative of the many ways consumers are looking to address digestive issues.

"In my clinical practice," said David Winson, a renowned herbalist, author and founder of the Herbalist & Alchemist line of herbal therapeutic supplements that includes bitters, "I regularly see people with significant digestive issues. I would say 60 percent of the people I have seen over the past 39 years have one or more gastrointestinal [GI] issue such as chronic dyspepsia, constipation, diarrhea, too much stomach acid, too little stomach acid, GERD [gastroesophageal reflux disease], SIBO [small intestine bacterial overgrowth], IBS [irritable bowel syndrome] and other GI problems."

Two age-old botanicals, artichoke leaves and ginger roots, have been developed by Indena in a special way to promote digestive function and help regular GI motility and nausea. Called Prodigest, the herbs are uniquely extracted via lipophilic CO2, and have been clinically validated. In one study, gastric emptying was improved 24 percent over placebo. In a larger follow-up study, indigestion symptoms improved 33.7 percent, and in a whopping 86 percent of the 126 study subjects.

Supplements give consumers a way to address this delicate issue in the comfort of their own kitchens. Here are leading ingredients that can help formulators stay on trend and provide relief to the burgeoning class of people with various types of digestive upset.[v]

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## Probiotics power positive poop

Probiotics are an interesting story because they started in foods, jumped to supplements, and are now expanding in hitherto unimaginable ways back into foods and beverages.

The entire probiotics category caught fire in the last decade as the messaging around probiotics' ability to attend to digestive issues became mainstream. The global probiotics market is projected to grow to $64 billion at a compound annual growth rate (CAGR) of 7 percent from 2017 to 2022, according to MarketsAndMarkets.

One company, Ganeden Probiotics, made its fortune through its flagship ingredient—a spore-forming bacterial strain called Bacillus coagulans GBI-30, 6086, with a branded name of GanedenBC30. From the company's launch in 2008 after it attained GRAS status, BC30 found success being integrated into foods and beverages. In a decade, the BC30 ingredient made it into a thousand SKUs in 70 countries, and has "averaged 40 percent growth a year for years," according to former president Mike Bush. The company sold to Kerry Group in 2017 for an undisclosed amount, and Bush sidled over and is executive director of the Ganeden/Wellmune functional ingredient division of Kerry.

It certainly helped that the company invested resources to design and publish 27 peer-reviewed studies on its ingredient. Those are quite sufficient for giving brands the confidence to promote digestive health and immune function as structure/function claims on product labels.

What makes BC30 so alluring for food and beverage makers is a combination of consumer compliance issues with supplements, a low efficacious dosage amount (only 500 million CFUs has shown effectiveness for digestion and immunity benefits), and its easy integration into a wide swath of CPG products thanks to it being a "spore-forming" ingredient—a protective shell around the bacteria protects it from harsh food-processing conditions.

With GanedenBC30, the only limitation is shelf-stable liquids, Bush said, as well as certain unreasonable heat parameters in some processing environments, and sterile or retort products that are designed to kill all bacteria.

"Typical probiotics have to be put in after processing," Bush said, "and their shelf life is limited so you're really talking the only good products are refrigerated or frozen foods. Even then, if you freeze a bifidobacterium or lactobacillus, a lot of time ice crystals form and burst the cells. I've seen 10 times overages just to survive the freezing process. So you see traditional probiotics used only as a part of fermentation for yogurts, and then all in supplements."

Probiotic supplements are shifting both in terms of the quantity of bacteria per pill as well as specialized strains that address health conditions other than general digestion or immunity. Strains are being studied that support kidney health (the "gut-kidney axis") and heart health and cholesterol conjugation.

One strain, L. gasseri SBT2055, compels the defecating body to excrete fat instead of being absorbed. A study among 30 healthy Japanese adults found 5 billion CFUs a day for only one week reduced belly fat and promoted weight loss.

A commercial probiotic product, Probio'Stick (ingredient combo supplied by Lallemand Health Solutions) found it prevented stress and promoted positive mood.

Researchers using 10 billion CFUs of the S. salivarius K12 strain found it was better than normal toothbrushing, flossing and mouthwashing in reducing the severity of bad breath in children.

"As research can now ascertain strain-specific health benefits," said Shaheen Majeed, Sabinsa's president worldwide, "condition-specific probiotic products are becoming expected."

## Prebiotics promote probiotics

Another spore-former is LactoSpore, a branded ingredient offered by Sabinsa. Published studies on its health benefits range from IBS to depression and cholesterol-modulation. Sabinsa supercharges its probiotic strain with a natural prebiotic soluble fiber fraction from the fenugreek seed, called Fenumannans. The pre/pro combo is called LactoWise.

The company has also taken a cranberry seed fiber ingredient, Crand'or, and combined it with LactoSpore.

In both cases, Sabinsa has published studies documenting the prebiotic properties of these novel prebiotic sources—they support the growth of the beneficial bacteria, which anaerobically ferment the prebiotic fibers and produce short-chain fatty acids (SCFA).[1] Specific SCFAs may reduce the risk of developing gastrointestinal disorders—as well as cardiovascular conditions and even cancer risk.

Cranberry and fenugreek are both well known for the benefits their actives provide, but until recently, little was understood about the prebiotic activity that brings added value to these botanical products. The combination of these prebiotics with probiotics—known as synbiotics—can be used for formulating shelf-stable probiotic foods and may provide additional nutritional as well as functional health benefits due to the presence of dietary fiber, protein, essential amino acids, fatty acids and proanthocyanidins.

"We certainly recognize the growing need in the marketplace for proper prebiotics, and with Sabinsa's understanding of probiotics, we feel the marriage of both is of prime importance to one's health," Majeed said. "These preliminary studies help set the stage for demonstrating such health benefits."

The tantalizing promise of synbiotics will no doubt continue to contribute to the growth of the category, even as prebiotics emerge as a separate category in their own right. Already, synbiotics are being studied in diabetic patients, for colon health and obesity.[2,3]


"We're at the beginning stages of the market development for prebiotics," said Steve Hanson, senior vice president of global sales at Prenexus Health, which is launching a new XOS prebiotic in 2019. "We believe there is a significant opportunity for the combination of prebiotics with probiotics as synbiotics. These innovations will combine the right prebiotic with the ideal probiotic in order to offer specific health benefits. These combinations will be supported by science."

And while prebiotics today are seen for their digestive health benefits, many see a similar trajectory to the probiotic path.

"As the research continues to prove their benefits," Hanson said, "we'll see emerging categories such as immune health, brain function and weight management become part of their benefits."

The Prenexus prebiotic boasts a low effective dose and is ideal for clean-label products, Hanson said.

## Fiber is for reinforcement

Old-school fiber has long been a staple of the geriatric set. Yet simple as its value proposition may be, the American Diabetes Association and World Health Organization agree that dietary fiber intake should be near 25 to 30 g/d—while Americans get a mean daily fiber intake of just under 16 g/d.

One gut health condition gaining in attention is leaky gut, which has been pushed into the spotlight because of the Roundup pesticide that's a standard part of genetically modified organisms (GMOs). From the other direction, a low FODMAP diet is gaining a hip cache, even if the acronym is doubtlessly over the heads of most: Fermentable Oligosaccharides, Disaccharides, Monosaccharides and Polyols. It just means food parts that can be poorly absorbed.

Leaky gut is associated with a range of hard-to-treat conditions from fatigue and depression to bloating and cognitive performance.[1]

"Leaky gut and FODMAPs are two really interesting topics for Nexira," said Julie Imperato, marketing manager for Nexira, which supplies Fibregum, a natural source of non-GMO, soluble fiber. "These are not really well-known yet by consumers even if these issues really affect and disturb the life of so many people.


Studies on Fibregum show it stimulates the growth of lactic acid bacteria at 10 g/d. It did not induce flatulence below 30 g/d, and doses higher than 50 g/d did not provoke abdominal cramps or diarrhea.

What's more, follow-up studies on Fibregum demonstrated a protective effect on intestinal gut wall permeability. It does this by increasing the number of tight junctions and reducing inflammation, thus leaving less space for toxins to leach in or out of the GI tract.[2]

## Licorice

Although the digestive health category is dominated by probiotics and prebiotics, opportunity exists for other evidence-backed ingredients. In particular, deglycyrrhizinated licorice (DGL), which has long been used to help patients with gastric and duodenal ulcers.

A commodity DGL standardized to at least 10 percent total flavonoids and less than 0.5 percent glycyrrhizin showed superior effects compared to regular aqueous-based DGL extracts. Its concentrated flavonoid content means an efficacious dose is only 150 mg/d—about 10 times less than traditional DGL.

"Gutgard is clinically tested," said Deepak Mundkinajeddu, Ph.D., head of R&D at Natural Remedies, "to support and manage symptoms of functional dyspepsia—indigestion and occasional heartburn."

## Resveratrol

It's an easy story to tell, that probiotics and prebiotics can help modulate gut microbiota. But emerging research has uncovered that increased consumption of polyphenols can also have a positive effect. An advantage of polyphenols is that they can also exert inflammation-modulating as well as antioxidant effects on a cellular level.

The red wine molecule made a smash entrance to the nutraceuticals world more than a decade ago, when Harvard researchers discovered life-extension properties. Resveratrol got sidelined by the media telling the (incorrect) story that irresponsible, if not impossible, levels of wine would need to be consumed to receive the health benefits.

Resveratrol may get its groove back because of evidence of a modulating effect on gut microbiota. It does this by encouraging growth of good bacteria and limiting the growth of pathological bacteria. It may also play a role in maintaining normal gut permeability—this is the leaky gut play.

"The latest thinking," said Clare Panchoo, commercial director of EMEA Evolva, which supplies the Veri-te brand of resveratrol, "is that resveratrol's modulation of gut microbiota may also explain many of the health benefits seen with resveratrol supplementation such as blood glucose control, reduced total cholesterol and improved cognitive health."

Evolva has just completed a study (awaiting publication) evaluating Veri-te on gut microbiota, levels of systemic inflammation and multiple aspects of brain function.

## It's a gut feeling

From the traditional fiber, to the legacy probiotics, to the complementary prebiotics, to improved versions of old standby licorice, to new scientific discoveries giving new life to a would-be blockbuster, the gut-health category continues to grow and diversify.

"The future of the digestive health market can be summed up in three words," Hanson said. "Growth, science and opportunity. In terms of nutritional categories, it is one of the most compelling areas right now."

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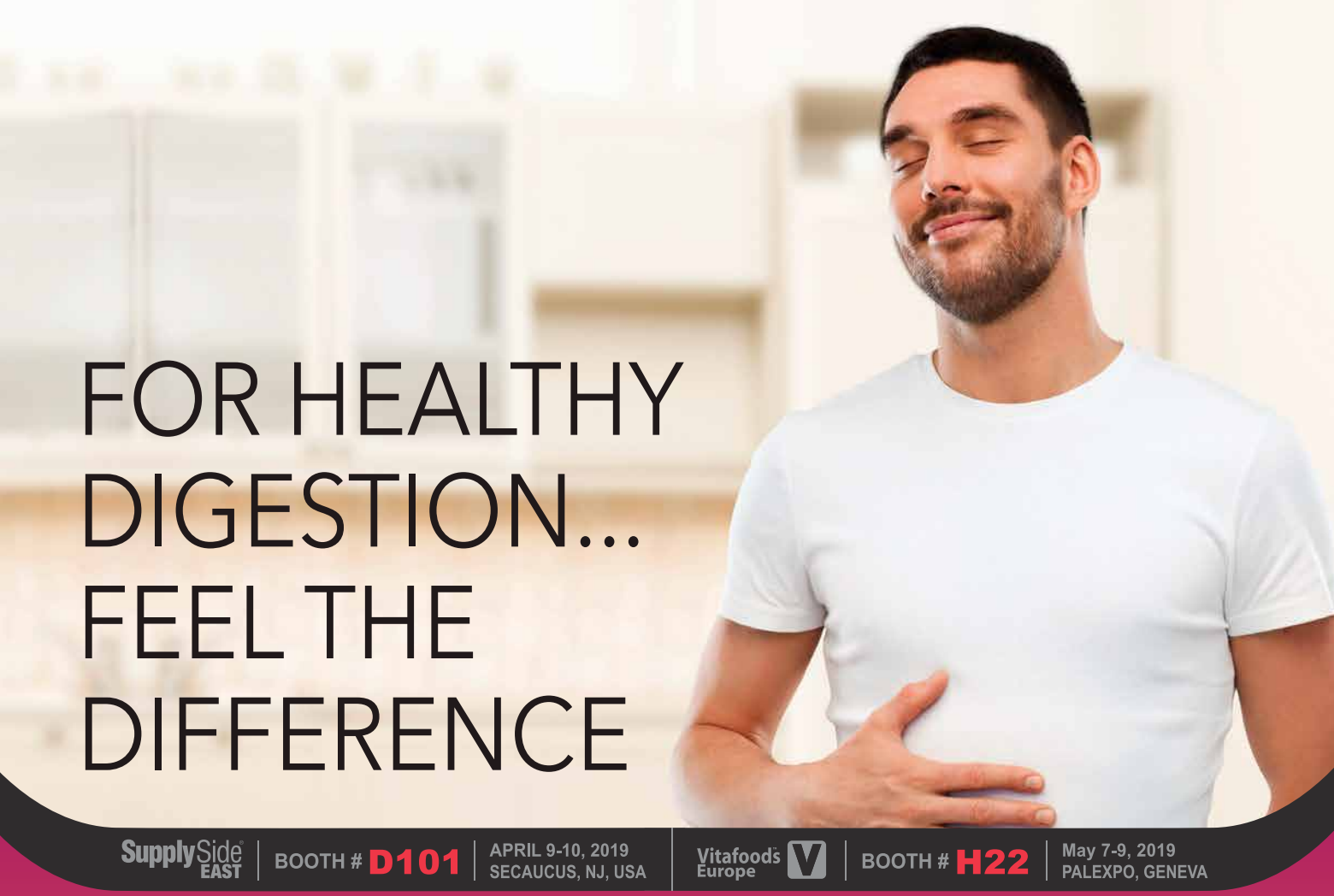

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# The right testing for probiotic and enzyme applications

by Tammy Blakemore

**INSIDER's take**

- Enzymes and probiotics can be difficult to test for potency due to the activation and live nature of these ingredients.
- Brands must use the same enzyme activity methods among its testing labs to accurately compare results.
- Probiotic testing procedures are specific to each supplier, so the compendia of methods is growing.

**Common digestive health supplement ingredients such as probiotics and** enzymes can be a challenge to understand because these specialty ingredients are unique. For starters, most supplement ingredients are labeled for potency or strength by weight or mg amounts. However, enzymes are measured using activity units, and probiotics are labeled using colony forming units (CFU). Weight units may also be listed on a label containing these ingredients, but do not reliably confirm that they are active or viable, which is of utmost importance for efficacy. Because of this, testing these specialty ingredients with accuracy is difficult, as the test methods are unusual and may not be run in most labs.

The top goal should always be to manufacture quality products, and following GMPs (good manufacturing practices), along with verification and testing, is necessary to ensure the identity, purity, strength and composition consistently meet the specification of the product, according to FDA's Center for Food Safety and Applied Nutrition (CFSAN) "Dietary Supplements—Guidance for Industry: Current Good Manufacturing Practice in Manufacturing, Packaging, Labeling, or Holding Operations for Dietary Supplements; Small Entity Compliance Guide."

Difficult questions may arise when the results do not meet specifications. This often triggers a hurried scramble to determine the reason for the testing discrepancies. The variances could be due to a variety of factors. The product may be sub-potent and needs to be re-manufactured, or there could be other explanations for the out-of-specification (OOS) results. A few possibilities might include improvement in raw material qualification, lab-method proficiency, testing method alignment, co-ingredient interference or accuracy of the specification. These and other potential reasons should be investigated when there is an OOS result.

Many enzyme activity assays and probiotic enumeration methods come from compendial sources, but many industry methods are available, as well. Ensuring the lab and the ingredient supplier are running the same method is one significant factor in getting results that are comparable. Additionally, making sure the lab is skilled, and runs the correct method with proficiency and repeatability, is another critical aspect.

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Using enzyme activity compendial methods the lab is proficient in is often more important than matching the supplier units. In the enzyme industry, the activity listed may be units from the country of origin or other proprietary activity units. Using compendial methods from the United States Pharmacopoeial Convention (USP)/Food Chemicals Codex (FCC), AOAC or other compendia will give the activity units most often listed on labels for finished products that will be sold in the United States. Running compendial methods provides an apples-to-apples comparison across multiple suppliers for the same ingredient. This gives a positive example of results being reported in different units than the supplier, but may be difficult to return the material if the potency is low, so planning is advised when deciding not to run the supplier method.

Probiotic testing methods are usually specific to the supplier and are generally designed for raw material verification. As the probiotic industry grows, more methods are being added to the compendia which compare similar genus probiotic ingredients, but method alignment for the industry is slow. The labeling guidelines, which follow probiotic best practices, as described by the Council for Responsible Nutrition (CRN) and the International Probiotics Association (IPA) are to label single strains or blends with combined strains in a total CFU/g label claim. Labeling the CFU count for a product containing a single strain is more straightforward than enumerating a blended-strain product. The goal is to use one CFU method for obtaining overlapping growth of a multi-probiotic blend. This may take some research and development (R&D) work in addition to communication with the lab to determine the best method to obtain accurate total CFU/g results.

Other challenges with testing enzymes and probiotics in digestive products include interference from co-ingredients that can cause the test method not to perform properly. Both enzyme and probiotic methods require controlled pH assay conditions. When other ingredients are added to these blends, it can change the pH of the test solution, and then pH adjustments may be necessary to have optimum recoveries. These method changes should be discussed, and possible validation work may be needed.

Each product is unique, and testing challenges can vary depending on the ingredient combinations. The ideal time to have these discussions and gain an understanding of product testing is during the product development stages. Many unexpected things can be discovered during testing; waiting until manufacturing is complete to uncover these issues may cause stress and shipping delays. Putting high-quality products on the market takes time, planning and organization, but working with experienced partners will help make a successful product launch that represents a brand with confidence to the consumer. And, when it comes to the consumer, putting the best foot forward with quality products should always be the highest priority.

*Tammy Blakemore is general manager at SORA Labs, a third-party dietary supplement testing lab that specializes in enzyme activity testing and probiotic enumeration.*

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# Leveraging new consumer trends as opportunities for digestive health

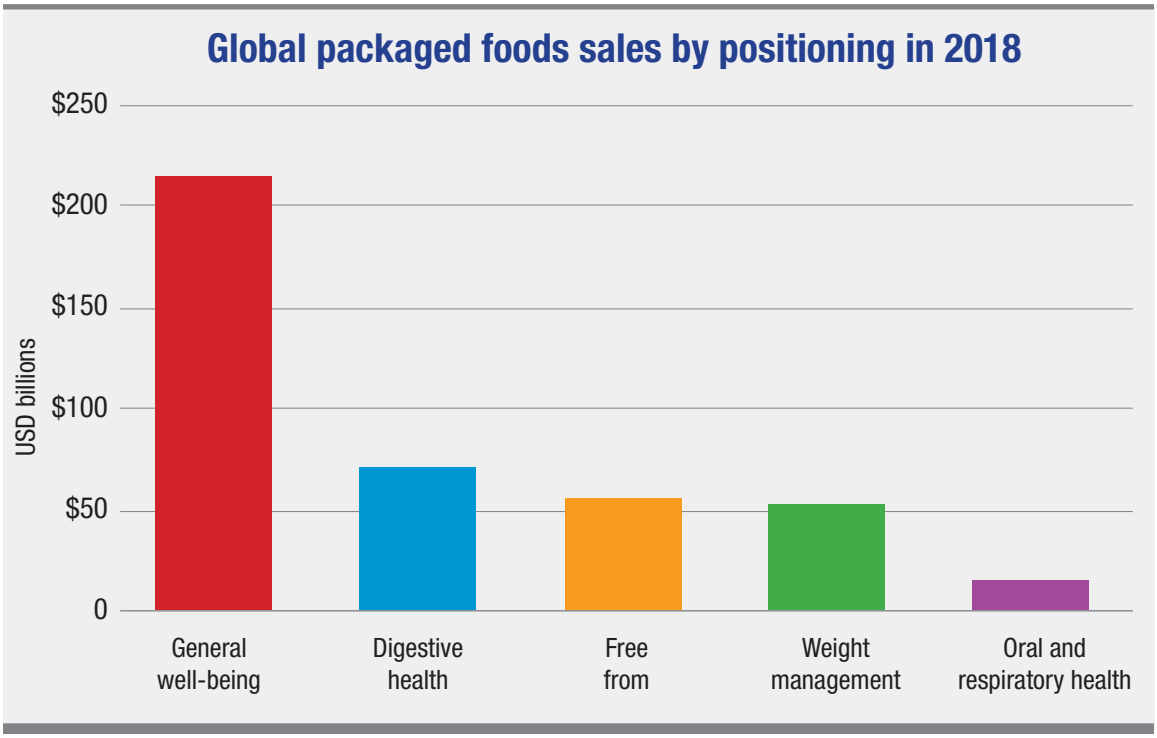
by Maria Mascaraque

**INSIDER's take**

- Foods with digestive health as their prime positioning are second in sales only to products that promote general well-being.
- The free-from movement aligns with digestive health with claims regarding the lack of gluten, lactose and dairy.
- Probiotic use in non-dairy foods addresses consumers' desire to improve their micobiomes while reducing their dairy intake.

**Consumers are familiar with digestive health and digestion. They know about** probiotics and good bacteria, and what to do when facing indigestion, digestive discomfort or suffering a slowdown in their digestive transit.

Indeed, digestive health is one of consumers' top health concerns. According to Euromonitor International, foods with digestive health as their prime positioning accrued sales of US$70.5 billion in 2018 globally, making it the second-largest positioning platform behind general well-being. It is also one of the most dynamic. Sales are expected to grow at a 3 percent compound annual growth rate (CAGR) through 2023, according to Euromonitor, just behind smaller, niche categories such as energy-boosting and eye health packaged foods.




*Source: Euromonitor International*

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At the same time, food intolerance, food allergies, irritable bowel syndrome (IBS) and other chronic diseases continue to rise dramatically. Though aware of digestive health, consumers know little, or are just starting to learn more, about the complexity of the gut and its true role in the rise of these health conditions.

## The free-from movement leads the way in digestion

The free-from movement is strongly related to digestive health. As the number of allergies and intolerances to gluten, dairy and lactose rise globally, consumers looking for relief from chronic digestive complaints fuel the boom in free-from products. Gluten-, lactose- and dairy-free products are often seen as healthier, more natural and easier to digest, which expands the consumer base beyond those who are intolerant and allergic to the masses, with further growth expected over the coming years. Overall, the free-from category posted the most dynamic growth within health and wellness packaged food from 2013 to 2018, delivering a 6.6 percent CAGR globally, according to Euromonitor, which shows the scale of its success.

New product developments have accelerated growth in the free-from category, with more manufacturers entering the space offering innovative and appealing products to attract consumers. New ingredients have also entered the scene, and ancient grains is one of the most popular. From quinoa to amaranth, buckwheat or spelt, ancient grains are highly nutritious and versatile and can be integrated into gluten-free cereal-based foods or dairy-free alternatives.

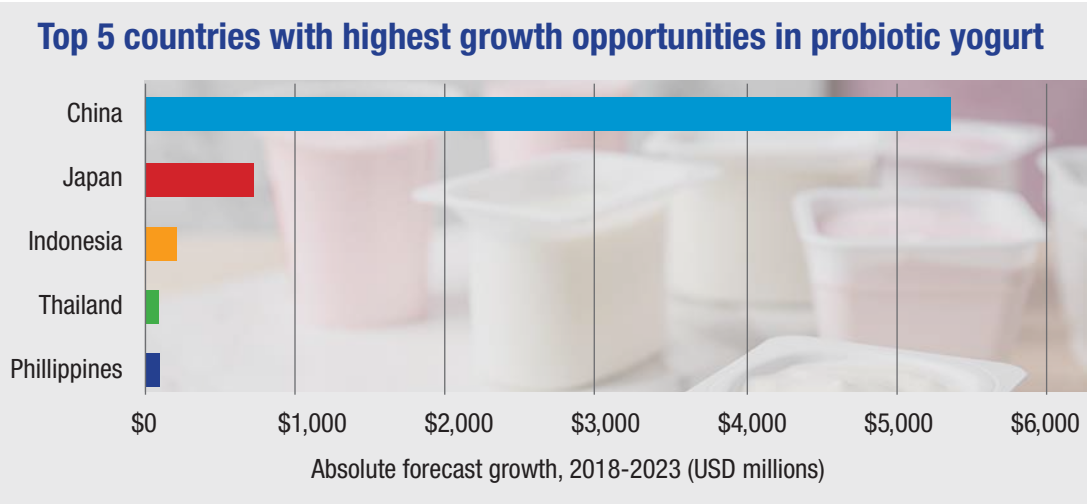
Spain is a good example of developments in this space. Vive Soy (Grupo Leche Pascual SAU), the second-largest milk alternative brand in Spain, offers a wide range (almond, soy, oat and rice) of products, but ancient grains have taken priority in its latest offerings. Its spelt-based milk launched in December 2017, and a new mixture of quinoa and rice milk will hit shelves in April 2018.

Another trend getting more prominence in the dairy-free space is mimicking cow's milk. A good example showcasing this is the dairy-free alternative Mylk (Rebel Kitchen), available in the U.K. This blend of coconut, cashews and brown rice is just like cow's milk, offering three variants: semi-skimmed, skimmed and whole. The brand has continuously grown in popularity, hitting retail sales of $1.4 million in 2018, according to Euromonitor.

## Probiotics win in dairy-free alternatives

Probiotics have dominated the digestive health scene for many years. They were inextricably linked to healthy bowel movements and even immune support in consumers' minds. However, the publicized difficulties in attaining authorized health claims, most notably in the EU, have hindered growth of probiotic yogurt over the last few years, with no signs of recovery ahead.

Although probiotic yogurt is losing traction in the Western world, opportunity is still massive in several emerging markets. China will see the most robust absolute growth in probiotic yogurt over the coming years, estimated to gain $3.5 billion in retail sales by 2023, according to Euromonitor. With increasing health awareness of digestion and constant marketing of probiotic benefits by yogurt manufacturers, yogurt is considered a healthy product beneficial to both appetite and digestive health by Chinese consumers. In addition, eating yogurt every day has become a habit for many since it is portable and easy to consume, making it an ideal breakfast or snack.




*Source: Euromonitor International*

In developed markets, trends are evolving, and opportunities remain plenty in high-growth, but smaller, categories other than yogurt. Kefir is gaining traction in Western markets due to its naturally high probiotic content and its benefits for gut health, in line with the increasing desire for fermented foods. A good example tapping into this trend is Wallaby, a brand of organic kefir that Danone now owns due to the WhiteWave acquisition. The brand's sales grew 13 percent from 2017 to 2018 in the United States to account for 4 percent of sour milk products, according to Euromonitor.

Moreover, while natural probiotics like kefir and sour milk products are rapidly extending out of their home countries in the Caucasus area, added probiotics has arrived in the dairy-free space, a rather unusual combination that has proved successful with Califia Farms in the United States.

Califia Farms is one of the fastest-growing free-from dairy brands in the United States that combines probiotics and dairy-free claims. According to Euromonitor, retail sales of its milk alternatives reached $87 million in 2018, accounting for a 1 percent share of the category in the United States, which is a remarkable achievement. Califia Farms is considered one of the biggest disruptors, not only tapping into plant-based milk, but also active in dairy-free yogurt, creamers and ready-to-drink (RTD) cold brew coffee.

## Is fiber the new protein?

Fiber has always been associated with digestive health in consumers' minds. Fiber-rich foods, such as whole grains and fruit, have long counted as traditional household remedies against constipation. However, during the last decade, consumers have been seeking protein as the ultimate nutrient instead of fiber. Although protein is still in the spotlight with no signs of slowing, a new trend toward "high fiber" is rising in parallel. While Western consumers are eating too much protein in their diet, they are not covering the recommended nutritional intake of fiber, according to USDA's National Health and Nutrition Examination Survey (NHANES), which means fiber-rich foods would be far more beneficial than high-protein ones.

The human microbiome is one of the latest big frontiers in nutritional science. Studies show the widespread lack of fiber in modern diets is depleting the bacterial ecosystem that resides in our digestive tracts, which might be linked to the rise in chronic disease.

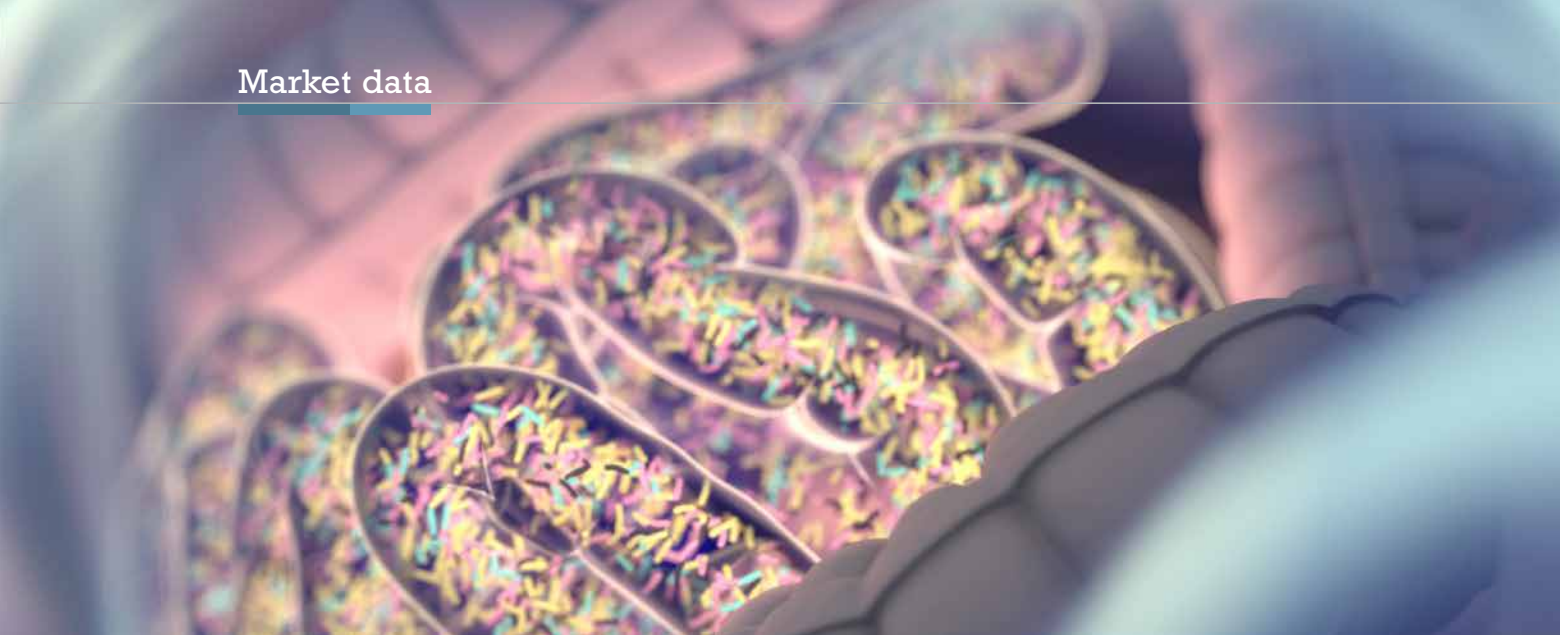
Last year, high-fiber claims appeared across several dairy products, both as a standalone and used in conjunction with other nutritional claims like "rich in calcium and vitamin D," among other vitamins and minerals. Among the many examples in this rapidly growing space, in the U.K., Arla debuted Arla Fibre, a range of yogurts with added fiber, but without the taste or texture of it, while Alpro revamped its oat drink with a "30 percent more fiber" claim. These developments come in response to the U.K. government highlighting that consumers are not hitting their recommended 30 g/d of fiber.

With more consumer awareness of the much-needed increase in fiber intake, fiber-rich foods have huge potential for success in the coming years.

## The microbiome: A long way to discover

Efforts are being made to better understand the functionality and role of the microbiome in the development of chronic diseases and mood disorders, looking to define the communication routes of the so-called gut-brain axis. A mounting number of studies indicated depleted microbiomes increase the risk of obesity,[1] diabetes,[2] cardiovascular diseases[3] and other chronic disorders,[4] showing the crucial role of our gut in multiple body functions beyond digestion.

As research evolves and more evidence comes to the fore linking poor gut health and impoverished microbiomes to the dramatic rise in chronic diseases, digestive health-positioned food with natural fibers and probiotics as well as fermented foods promise a major avenue for future development.



While there is ongoing research in this space, gut health-positioned foods have a bright future. From tapping into high-probiotic fermented foods and natural fibers or combining added probiotics and fibers in foods, digestive health foods can take several approaches, following hot consumer trends like the successful free-from opportunity.

*María Mascaraque, consultant, Euromonitor International (Euromonitor.com), is an industry expert on food and nutrition, with in-depth knowledge of health and wellness trends, contributing to the content and quality of Euromonitor International's research. María provides global expertise and forward-thinking insights identifying latest product developments and key market trends in areas such as dairy products and alternatives, free from, organics and functional foods.*

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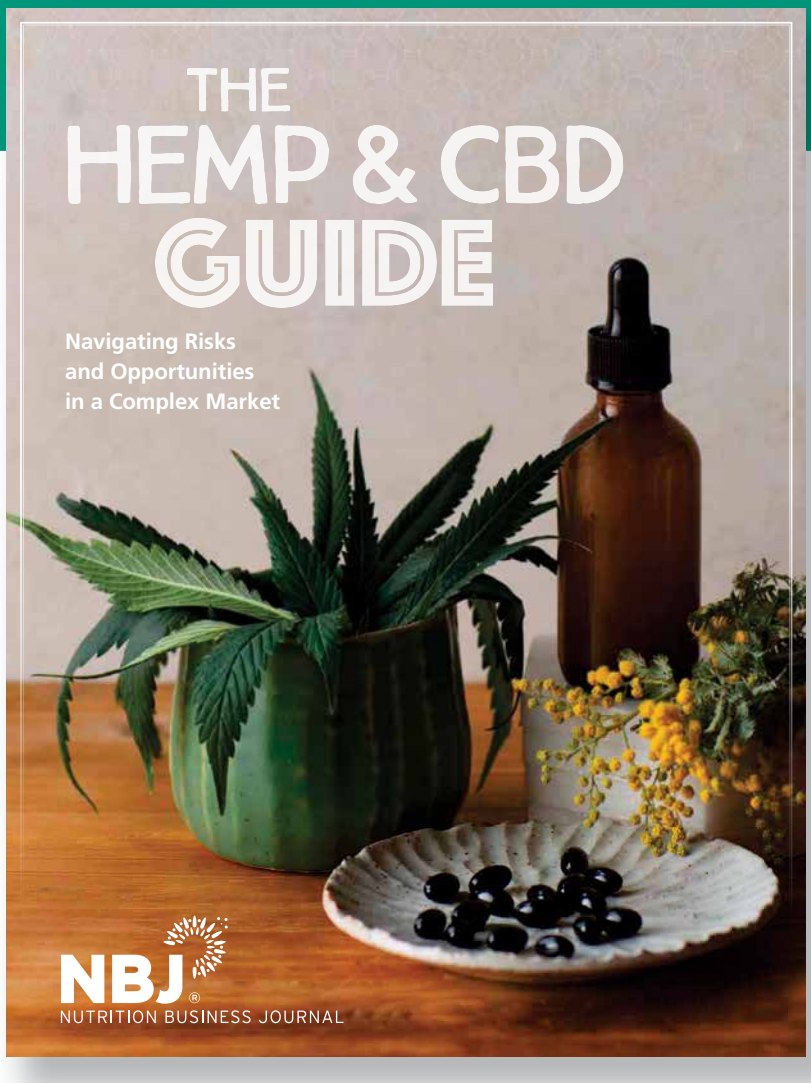

# Good gut health: Understanding consumer demand for good-digestion products

by Laurie Demeritt

**INSIDER's take**

- Consumer interest in selecting natural foods to improve digestive health has moved to the mainstream.
- Digestive health concerns drive gluten- and dairy-free diets, and the popularity of probiotics and fiber.
- Gut-friendly herbs, such as ginger, mint and chamomile, are increasingly used for supporting digestion.

**Interest in both good-digestion products and, consequently, what is sometimes** called "gut health" has been a rising element within complex consumer health and wellness behaviors for many years. The Hartman Group has seen overall cultural interest in the benefits of good gut health moving from the small demographic of "core" health and wellness adherents into the mainstream.

As evidence, we need look no further than the rise in popularity of kombucha—formerly an exotic, fringe, probiotic beverage home-brewed and imbibed by only the most heavily involved health and wellness consumers—which has now become a drink consumed for both digestive wellness and pleasure across all types of consumers. Today, kombucha can be readily found in either bottled form or at self-serve, on-tap kombucha bars in diverse retailers ranging from convenience to supermarket stores.

Cultural interest in gut health arises from consumer health and wellness beliefs that view quality foods and beverages as the linchpins of health and wellness. Quality foods and beverages (such as those viewed as "real, fresh and less-processed") have increasingly become the language consumers use to both assess and express their wellness values. At the same time, a cultural shift from a focus on older dietary constructs like "heart health" to a focus on digestion and the gut has begun. In the realm of gut health, consumer thinking revolves around a focus on the "health of the microbiome" as the root of wellness and choosing foods that help the body absorb nutrients most efficiently. Behaviorally, consumers are turning internally to their own bodily cues (starting with digestion) to judge the healthfulness of foods and beverages.




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Many people are not even aware they're concerned about digestion, but the signs are clear: Consumers talk about how certain foods "sit" with them and how they feel an hour or more after they've eaten—and they increasingly are interested in digestive aids. The Hartman Group's Health + Wellness 2017 report found consumers are adding nutrient-dense foods and beverages promoting satiety and good digestion to their diet, with more than one-third (38 percent) of consumers saying they are consciously adding probiotics to their diet.

Evidence of mainstream interest in digestion includes the rising availability of products with probiotic-rich cultured and fermented ingredients such as yogurt and fermented vegetables, all of which are believed to contain gut-friendly "good bacteria." Similarly, "gluten free" has seen widespread appeal because of connections consumers make between eating gluten-free to remedy general digestive discomfort and eating gluten-free as a tool linked to weight management.

Current diet experiments, like eating gluten- or dairy-free, reflect interests moving away from carbohydrate-laden, processed foods and toward a focus on supporting digestion. Overall, consumers are incorporating more dietary methods that support digestion and energy to the point that eating and evaluating foods for positive digestion has become an entirely mainstream phenomenon.

Consumers across all health and wellness segments have come to appreciate the perceived wide-ranging benefits of consistent digestive maintenance and associate such a focus with producing better energy, stronger immunity and consistent weight management.

In the dairy category, consumer beliefs linking inflammation and poor digestion can prompt a search for dairy alternatives—and a close examination of the source of lactose in diets. Whether they're conventional, organic, grass-fed or hormone-free, dairy products are increasingly cited as a source of chronic illnesses and digestive complaints. This arises from the suspicion that one of the proteins in milk, A1 casein, is highly inflammatory for some consumers. The search for alternatives to conventional dairy products has spawned a rapidly growing market for plant-based substitutes, including beverages and products produced from coconut, seeds, nuts, oats, rice and peas (pulses).


**Consumers are adding nutrient-dense foods and beverages** promoting satiety and good digestion to their diet, with more than one-third

**38%**

of consumers saying they are consciously adding probiotics to their diet.

*Source: The Hartman Group's Health + Wellness 2017 report*

Overall, consumer thinking on supporting good digestive maintenance can include:

- Diet elimination experimentation: Experimenting with avoiding or reducing food groups associated with digestive challenges, particularly gluten and dairy.
- Probiotic-rich foods: Embracing foods that support the digestive flora, particularly fermented foods (e.g., yogurt, kefir, kombucha, kimchi, etc.).
- Consuming whole foods: Moving away from center-store products and perceived "added chemicals" to nutrient-rich, plant-based "natural" diets.
- Digestive botanicals: Trying herbs and spices believed to soothe and support digestion, including ginger, mint and chamomile.

As consumers gain more health and wellness knowledge, they will continue to move from broad ideas about digestion and feeling well to nuanced understanding of how the body's systems are interconnected and affected by what is consumed. From the consumer perspective, food remains a vital part of the toolkit for feeling well, and even mainstream consumers seek ingredients (such as fiber, whole grains and probiotics) they believe support healthy digestion.

From trying new eating approaches to selective experimentation with digestion-friendly foods, consumers are deploying a growing range of tactics to improve gut health. In pursuit of wellness and experiences of discovery, consumers will continue to explore a diversifying landscape of foods and beverages that promote energy, satiety and good digestion. As consumers reexamine their diets, foods and beverage that promote gut health are coming to the fore, including healthy fats, collagen, resistant starch, fermented items and foods free of grain, dairy and markers of industrial production.

*Laurie Demeritt, CEO, The Hartman Group, drives the vision, strategy, operations and results-oriented culture for the company's associates as it furthers its offerings of tactical thinking, consumer and market intelligence, cultural competency and innovative intellectual capital to a global marketplace.*

# Takeaways: Science sells. Use it.

by Todd Runestad

**Digestive health has come a long way in only the last 10 years.**

Back before probiotics were a thing—heck, back before even discussing gut health was a thing—consumers had no real answers other than OTC medications.

Remember when the human genome was mapped out around the turn of the century? Because of that, you can't watch a crime show on TV without DNA evidence coming in to play. Genetics are a part of conversations in a wide range of industries.

The same trajectory seems to be at play with the human microbiome. In 2008, the National Institutes of Health (NIH) began the Human Microbiome Project, its goal to characterize the microbial communities from 300 healthy individuals, across several different sites on the human body: nasal passages, oral cavity, skin, gastrointestinal (GI) tract and urogenital tract.

We already have known that the microorganisms that inhabit the skin and mucous membranes in certain sites of the body play an essential role in maintaining health and normal function. The idea that changes in the human microbiome can correlate with changes in human health was a tantalizing hypothesis when the Human Microbiome Project began. Today, breathtaking advances are being reported in understanding the role of microbiota in cancer susceptibility. Cancer! Lesser health states, from obesity to diabetes, cognitive health to even hearing loss, have been reported to benefit with the use of various probiotic strains.

And that's where the beat meets the street.

When the promise of probiotics emerged a decade ago, product formulations were those in the dairy case—specifically, yogurt. That's where the live, active cultures were traditionally found, and brands like Yakult and, later, Dannon's Activia took up residence.

Then probiotics went further afield—but like many things in the supplements world, the market was way ahead of the science.

By and large, product developers that market an efficacious dose of probiotics need to do it in a supplement format. (The rare exception being the GanedenBC30 spore-forming probiotic strain, which has studies validating efficacy at only 500 million CFUs and can survive production environments that otherwise challenge probiotics.)

Many a supplements brand has taken that message to heart, and where a decade ago a 5 billion CFU dosage was standard, today you'll find 20 billion CFUs the standard with formulations going as high as 50, 100, 250 billion—there's even a product with 1 trillion CFUs.

Supplement makers are starting to differentiate and specify their probiotics, with different bacterial strains showing benefit for different health needs. So, brands looking for a specific benefit must be careful in their formulation strain and dosage level in order to realize the probiotic promise.

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**Inside** INSIDER

Q.

## What do you think the digestive health space will look like a year from now?

A. Product developers will continue to explore creative delivery forms beyond supplements to allow consumers to get more prebiotics/fiber and probiotics in their diet to boost gut health.

**Heather Granato**
*Vice President of Content*

A. I don't see probiotics popularity waning in 2020, but I think we'll continue to see increased interest in prebiotics as well as synbiotic and combination formulations as consumers and researchers gain greater understanding of the microbiome.

**Rachel Adams**
*Managing Editor*


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