


A close-up photograph of a man with a beard and sunglasses, wearing a colorful patterned shirt. He is holding a clear plastic bottle filled with a vibrant green smoothie and drinking through a black straw. The background is a soft-focus outdoor scene with green foliage.

Fibersol[®]

THE POWER OF COMFORT

Benefits of well-tolerated fiber



If a product causes gastrointestinal discomfort—for any reason—most consumers will not buy it again¹

Fibersol® makes it easy to formulate high fiber products that are well tolerated by consumers

THE RELATIONSHIP BETWEEN DIGESTION AND TOLERANCE

Indigestible carbohydrates such as sugar alcohols and dietary fibers escape complete digestion and absorption in the small intestine, increase osmotic pressure in the digestive tract, and can be fermented in the large intestine by gut microbes. This increase in osmotic pressure and off-gas from fermentation can cause distension in the gut and lead to bloating, flatus, cramping and other gastrointestinal side effects.²

Differences in fermentation rates can have significant impact on the severity of gastrointestinal side effects and in turn, determine the tolerability of a dietary fiber.³

Soluble fibers are often used in many functional and/or low-calorie food and beverage products. However, not all are created equal. The smaller molecular weight indigestible carbohydrates are more rapidly fermented by microflora resulting in faster rates of fermentation. Rapid fermentation is associated with greater gastrointestinal side effects and discomfort.

Larger molecular weight soluble dietary fibers are more slowly fermented and are associated with fewer side effects and significantly higher levels of digestive tolerance.

Fibersol®

FIBERSOL® AND DIGESTIVE TOLERANCE

A high-quality line of well-tolerated soluble prebiotic dietary fiber ingredients, Fibersol® is a resistant maltodextrin that is not associated with severe gastrointestinal symptoms.

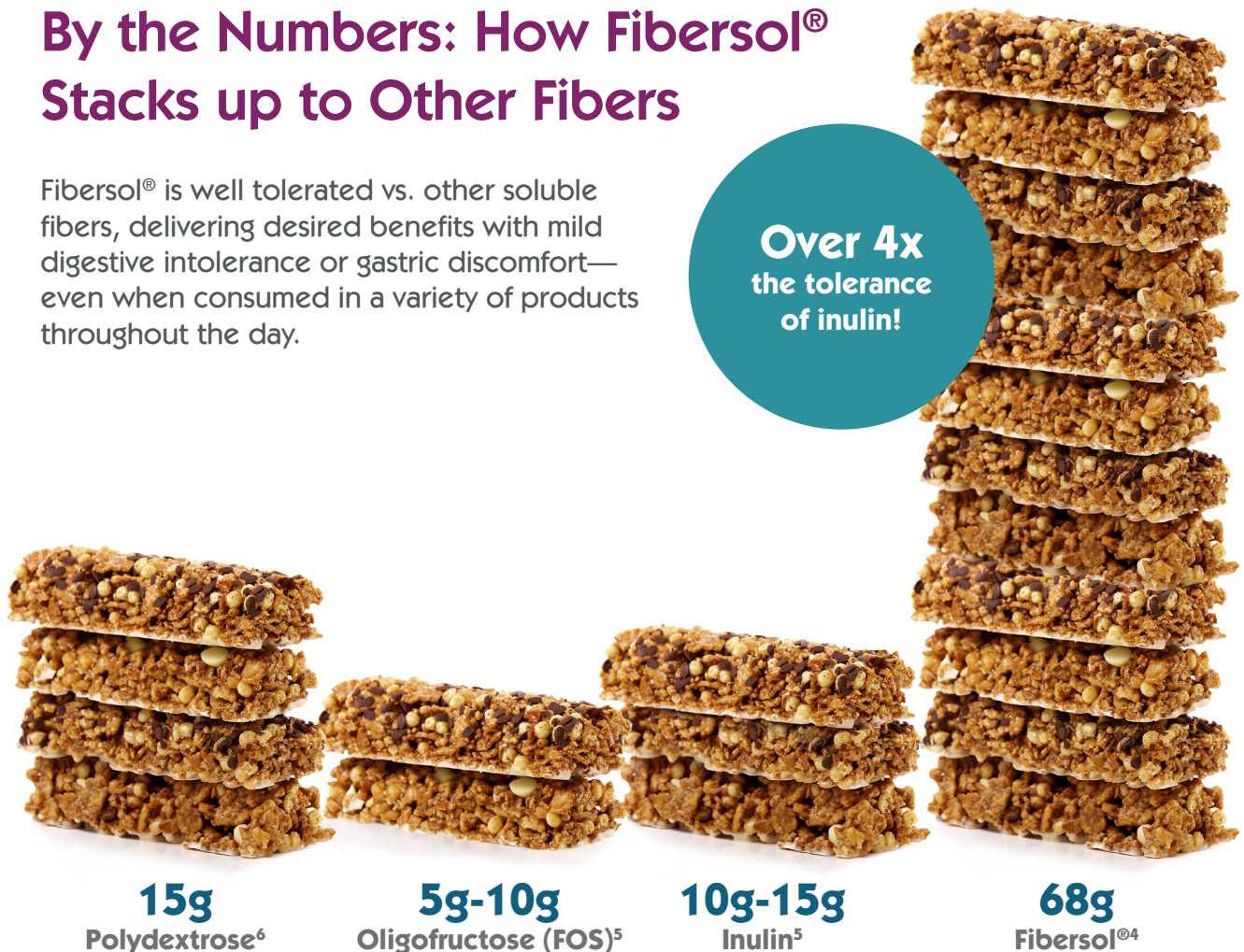
In a study to determine the maximum dose of resistant maltodextrin that does not cause severe symptoms of gastrointestinal discomfort such as bloating, gas or diarrhea,⁴ Fibersol® was associated with mild effects.

Over 30 years of extensive clinical research have shown Fibersol® to be well tolerated up to 68 grams per day.⁴

By the Numbers: How Fibersol® Stacks up to Other Fibers

Fibersol® is well tolerated vs. other soluble fibers, delivering desired benefits with mild digestive intolerance or gastric discomfort—even when consumed in a variety of products throughout the day.

**Over 4x
the tolerance
of inulin!**



Daily Limit (g/day)

FOLLOW ITS PATH TO SEE WHY FIBERSOL® IS SO WELL TOLERATED



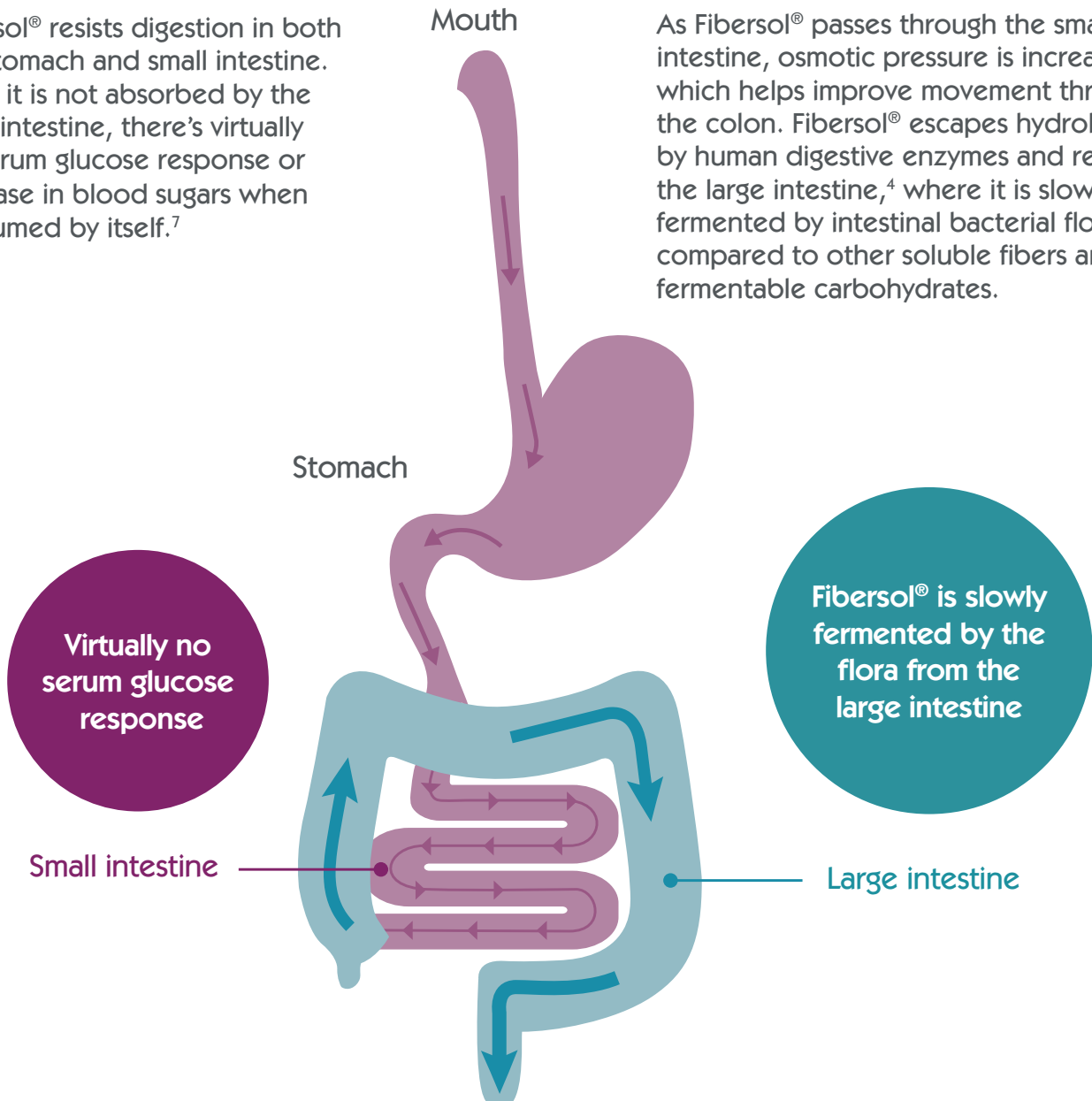
A Short Stop in the Small Intestine

Fibersol® resists digestion in both the stomach and small intestine. Since it is not absorbed by the small intestine, there's virtually no serum glucose response or increase in blood sugars when consumed by itself.⁷



Slow and Steady in the Large Intestine

As Fibersol® passes through the small intestine, osmotic pressure is increased, which helps improve movement through the colon. Fibersol® escapes hydrolysis by human digestive enzymes and reaches the large intestine,⁴ where it is slowly fermented by intestinal bacterial flora compared to other soluble fibers and fermentable carbohydrates.

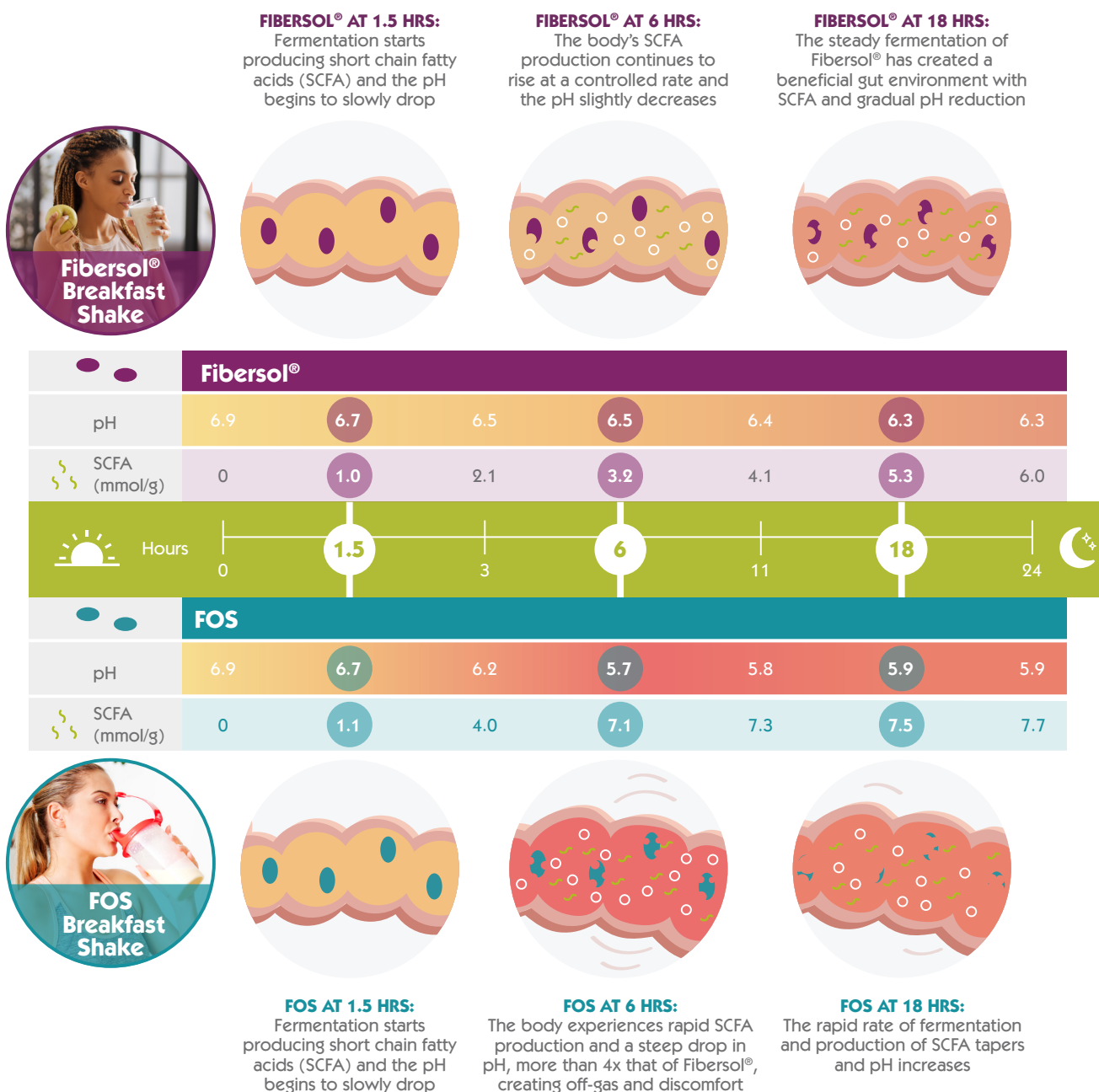


Intestinal Regularity

In a range of studies, Fibersol® was shown to increase fecal bulk, decrease symptoms of occasional constipation and support stool frequency.⁸⁻¹¹

RATES OF FERMENTATION AND IMPACT ON COMFORT

Well-tolerated Fibersol® vs Oligofructose (FOS)



Short Chain Fatty Acid Production

In a model representing large intestine fermentation, gut bacteria begins to ferment Fibersol® into short chain fatty acids (SCFAs), which are important to maintaining a healthy gut environment and can encourage health-promoting properties such as improved intestinal movement and enhanced absorption of certain minerals.

The Proof is in the pH

When fiber is fermented in the colon, SCFAs and off-gas are produced. The production of SCFAs lowers the pH of the colon. The rate at which the pH of the colon drops is indicative of the rate of fermentation and off-gas.³ Since Fibersol® ferments slower than fibers like FOS or inulin, as reflected in slower decrease of *in vitro* pH, there is far less rapid off-gassing, and therefore, less gastrointestinal discomfort.¹²



CONSUMERS AND TODAY'S FIBER GAP

Even though nearly 80% of consumers believe that fiber is important and try to include it in their diets,⁵ their efforts aren't always successful: more than 95% fall short.¹³



Fiber is the **top ingredient** consumers seek.¹



Nearly **2/3 of consumers** say they are **adding or increasing fiber** in their diet, up 6% in recent years.¹



65% of consumers associate fiber with supporting their immune system.¹⁴

It can be a challenge to achieve the daily recommended value of fiber by consuming traditional food products alone.

Current Daily Value (DV) for total dietary fiber:
28g per day (for typical 2,000 calorie per day diet)

There's a fiber gap for consumers between **adequate** intake and **actual** intake, and



"...surveys indicate that only about 5% of the population meets recommendations, and inadequate intakes have been called a public health concern."¹³

WHAT'S CAUSING MY DISCOMFORT?

sugar

stress

lactose

fiber

gluten

The majority of consumers (nearly 70%) said they would NOT purchase a product again if it caused gastrointestinal discomfort.¹

They may not always know the exact source of digestive discomfort, but it still impacts repeat purchases. Often, consumers blame their personal diet choices or emotional health conditions;¹⁵ however, the fiber source in better-for-you food and beverages may be playing a role in their discomfort.

REPEAT PURCHASES START HERE

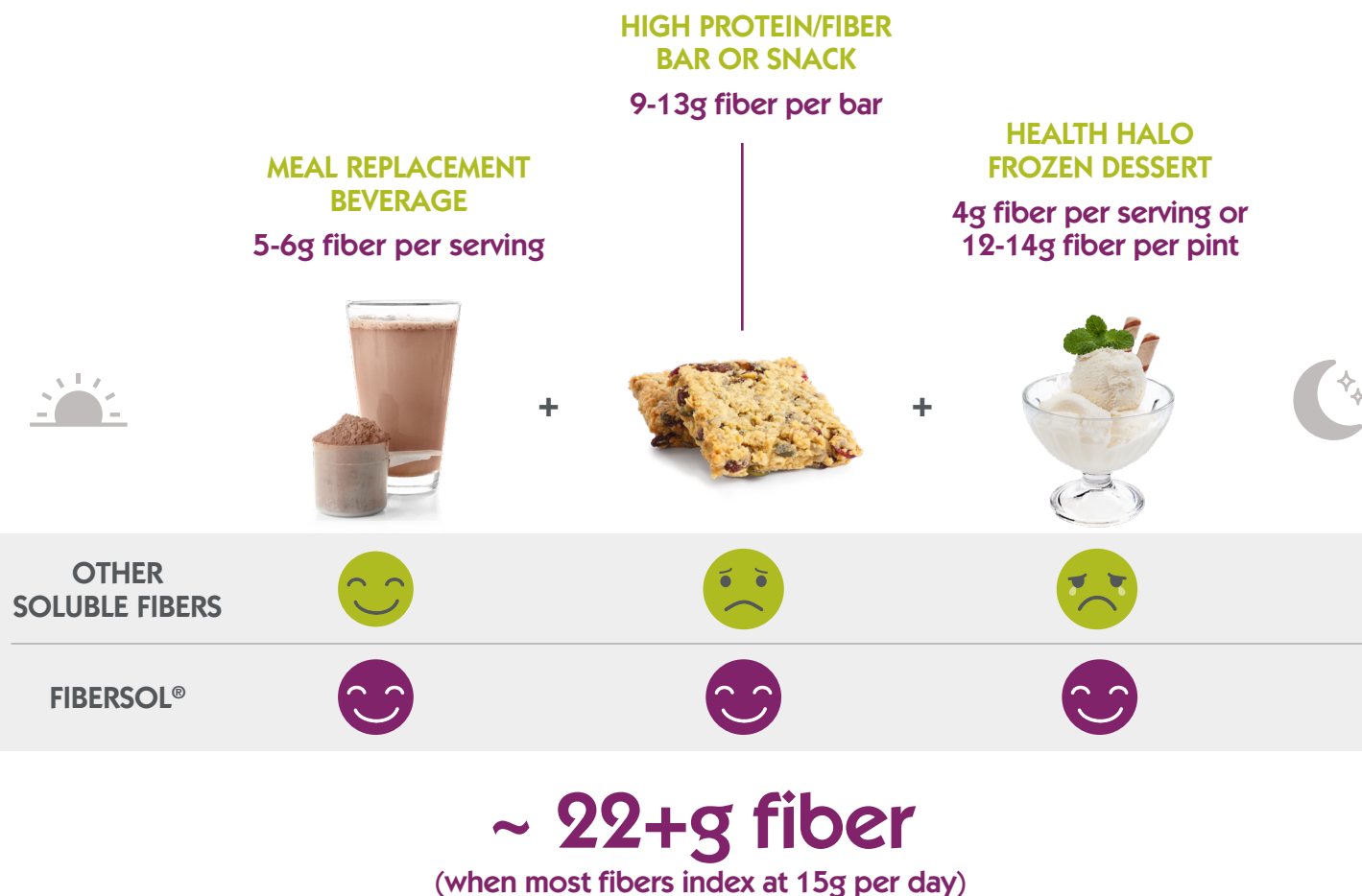
Especially in high fiber products, well-tolerated Fibersol® helps create repeat purchase opportunities.

HIGH-FIBER PRODUCTS ARE ON TARGET WITH TODAY'S DEMANDS

Not all fiber is created equal!

Fibersol® is well tolerated—at up to 68g per day.

Fortified and reduced sugar products are high in demand and may be consumed regularly throughout the day. Fiber supports these formulations, but can cause discomfort if the tolerance limit is reached quickly.



It all adds up!

With products containing less-tolerable fiber ingredients, consumers may feel discomfort as they nourish and snack throughout the day.

Fibersol® allows for positive nutrition and indulgences with mild gastrointestinal discomfort—from morning to night.



Digestive health and additional benefits, with science you can trust

Fibersol® helps you offer healthy digestion. Even better? Nutrition-forward prebiotic fiber can help support the gut microbiome, which is shown to play a role in overall immune function.



Digestive Health

At 4-8g daily, Fibersol® is shown to:

- Help support or maintain intestinal regularity
- Help relieve occasional constipation
- Support gut health
- Improve stool consistency (selected studies)



Post-Meal Blood Glucose and Insulin

At 4-6g with each meal, Fibersol® is shown to:

- Help reduce blood sugar levels after a meal
- Help minimize blood sugar spikes after a meal



Prebiotic

At 6g per serving, Fibersol® may:

- Help nourish the intestinal flora and maintain a healthy intestinal tract environment



Post-Meal Triglycerides

At 5-6g with each meal, Fibersol® is shown to:

- Help attenuate the rise in blood triglycerides following the meal
- Help retain healthy triglyceride levels following the meal



Satiety

At 10g with a meal, Fibersol® may:

- Delay hunger and stimulate appetite-regulating hormones

PROMOTE TOTAL WELLBEING WITH WELL-TOLERATED FIBERSOL®

The Fibersol® line of soluble dietary fiber ingredients have been shown to help maintain intestinal regularity. Since Fibersol® is fermented in the colon at a slower rate, compared to other soluble fibers such as inulin or oligofructose, it helps minimize bloating or gastric discomfort.

Not only does Fibersol® help today's wellness-minded consumers maintain intestinal regularity and a healthy digestive system, it does so comfortably.



Sources

¹ ADM Outside VoiceSM Fiber Consumer Study, 2019.

² Harder H, Serra J, Azpiroz F, Passos MC, Aguadé S, Malagelada JR. "Intestinal Gas Distribution Determines Abdominal Symptoms." 2003. *Gut*. 52(12):1708-1713. DOI:10.1136/gut.52.12.1708.

³ Noack J, Timm D, Hospattankar A, Slavin J. "Fermentation Profiles of Wheat Dextrin, Inulin and Partially Hydrolyzed Guar Gum Using an In Vitro Digestion Pretreatment and In Vitro Batch Fermentation System Model." 2013. *Nutrients*. May 3, 2013; 5(5):1500-1510. DOI:10.3390/nu5051500.

⁴ Yuka Kishimoto, Sumiko Kanahori, Katsuhisa Sakano, Shukuko Ebihara. "The Maximum Single Dose of Resistant Maltodextrin That Does Not Cause Diarrhea in Humans." 2013. *J Nutr Sci Vitaminol (Tokyo)*. 59(4):352-7. PMID: 24064737 DOI: 10.3177/jnsv.59.352.

⁵ A. Bonnama; et al. "Gastrointestinal Tolerance of Chicory Inulin Products." 2010. *Journal of the American Dietetic Association*. June 2010; 110(6): 865-868.

⁶ As codified by FDA.

⁷ Okuma, K. 2002. *J Appl. Glycosi*. 49: 479-485.

⁸ M Satouchi, S Wakabayashi, K Ohkuma, K Fujiwara, A Matsuoka. "Effects of Indigestible Dextrine on Bowel Movements." 1993. *Jpn. J. Nutr*. 51: 31-37.

⁹ Y Kishimoto, Y Yoshikawa, S Miyazato, H Oga, T Yamada, H Tagami, C Hashizume, K Yamamoto. "Effect of Resistant Maltodextrin on Digestion and Absorption of Lipids." 2009. *Journal of Health Science*. 55(5): 838-844.

¹⁰ DJ Baer, KS Stote, T Henderson, DR Paul, K Okuma, H Tagami, S Kanahori, DT Gordon, WV Rumpler, M Ukhanova, T Culpepper, X Wang, V Mai. "The metabolizable energy of dietary resistant maltodextrin is variable and alters fecal microbiota composition in adult men." 2014. *J. Nutr*. 144(7): 1023-1029.

¹¹ Nathaniel Fastinger, et al. "A Novel Resistant Maltodextrin Alters Gastrointestinal Tolerance Factors, Fecal Characteristics, and Fecal Microbiota in Healthy Adult Humans." 2008. *Journal of American College of Nutrition*. 27(2):356-66. DOI: 10.1080/07315724.2008.10719712.

¹² EA Flickinger, BW Wolf, KA Garleb, JM Chow, GJ Leyer, PW Johns, GC Fahey. "Glucose-Based Oligosaccharides Exhibit Different In Vitro Fermentation Patterns and Affect In Vivo Apparent Nutrient Digestibility and Microbial Populations in Dogs." 2000. *J. Nutr*. 130:1267-1273.

¹³ Diane Quagliani, Patricia Felt-Gunderson. "Closing America's Fiber Intake Gap: Communication Strategies From a Food and Fiber Summit." 2017. *Am J Lifestyle Med*. Jan-Feb; 11(1):80-85. PMID: 30202317 DOI: 10.1177/1559827615588079.

¹⁴ FMCG GURUS: "How Has COVID-19 Changed Consumer Behaviour." March 2021.

¹⁵ ADM Outside VoiceSM Stomach Discomfort Social Listening, December 2020.

Fibersol® is supported by the joint venture between Archer Daniels Midland Company, Matsutani Chemical Industry Co., Ltd., and Matsutani America, Inc., a global selling and marketing partnership combining strong technical and scientific expertise with a vast global production and transportation network, for a high-quality food ingredient backed by attentive, reliable service and supply.

Fibersol® is a registered trademark of Matsutani Chemical Industry Co., Ltd.

© 2021 ADM / Matsutani LLC

ARCHER DANIELS MIDLAND COMPANY DISCLAIMS ANY AND ALL WARRANTIES, WHETHER EXPRESS OR IMPLIED, AND SPECIFICALLY DISCLAIMS THE IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, AND NON-INFRINGEMENT. OUR RESPONSIBILITY FOR ANY CLAIM IS LIMITED TO THE PURCHASE PRICE OF MATERIAL PURCHASED FROM US. CUSTOMERS ARE RESPONSIBLE FOR OBTAINING ANY LICENSES OR OTHER RIGHTS THAT MAY BE NECESSARY TO MAKE, USE, OR SELL PRODUCTS CONTAINING OUR INGREDIENTS. ANY CLAIMS MADE BY CUSTOMERS REGARDING INGREDIENT TRAITS MUST BE BASED ON THE SCIENTIFIC STANDARD AND REGULATORY/LEGISLATIVE REQUIREMENTS OF THE COUNTRY IN WHICH THE FINAL PRODUCTS ARE OFFERED FOR SALE.