

Latest Developments in Fiber for Tortillas



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About Bay State Milling



Who we are

Bay State Milling combines a 120-year family-owned heritage in wheat milling with the latest advancements in plant-based nutrition.

Our Commitment

To develop innovative plant-based ingredients that enable our customers' products to win in the market.

What We Do

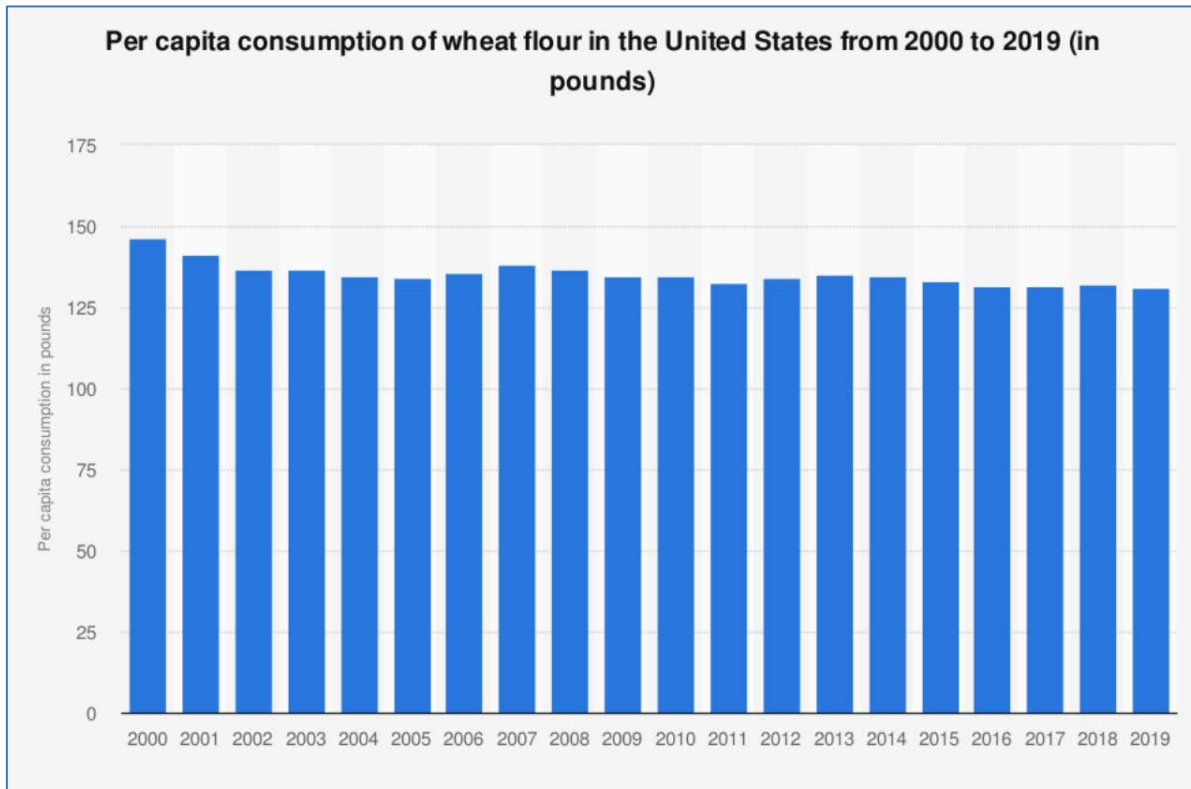
We address customer needs by identifying plant varieties with unique traits, scaling identity-preserved supply chains and commercializing new-to-the-world ingredients through leading-edge food science, nutrition and marketing expertise.

How We're Different

We create value by leveraging our network, know-how and assets to transform proprietary agricultural sources into sustainable, high-performing and better-for-you ingredients to power next generation consumer products.

The Case for Innovation with Fiber

Wheat based food consumption is declining:



Source: Statista



Source: U.S. Census Bureau, IRI, Economist Intelligence Unit, Mintel

Rising Demand for Fiber: An Untapped Market

Early-adopting consumers recognize multitude of benefits derived from fiber and taking steps to find products that deliver them

WHY IT MATTERS



Today's US population in midst of the Fiber Gap: **Only 5%** of people get the **recommended daily dose** of fiber ¹

THE WAVE IS COMING



60% of consumers are actively **trying to consume** more fiber ²

HIGH PURCHASE INTENT



9 in 10 consumers are **interested in buying** products made with High Fiber Flour and replacing flour typically used with a High Fiber version ³

EMERGING UNDERSTANDING OF FIBER'S HEALTH HALO



Fiber **ranked #1 in perceived healthfulness** (above plant-based protein, whole grain, probiotics, etc.) ²

Fiber is Trend Centric!

Permissible Indulgence

Fiber Claims

Clean Label

Digestive Wellness

Keto Friendly

Low Carb

Immune Enhancing



Types of Fiber and Health Benefits



Viscous (Insoluble) Fiber

- Lowers LDL cholesterol
- Aids blood sugar management

Ex: Psyllium, Beta Glucan
Pectin

Insoluble Fiber

- Prevents constipation
- May reduce colorectal cancer risk

Ex: Oat Hull, Cellulose,
Sugarcane

Fermentable Fiber

- Promotes digestive and gut health
- Delivers prebiotic effects
- Supports immunity health

Ex: Modified wheat starch,
Inulin, High Amylose Wheat Flour

Benefits of Prebiotic Fiber

Definition of Prebiotic Fiber:

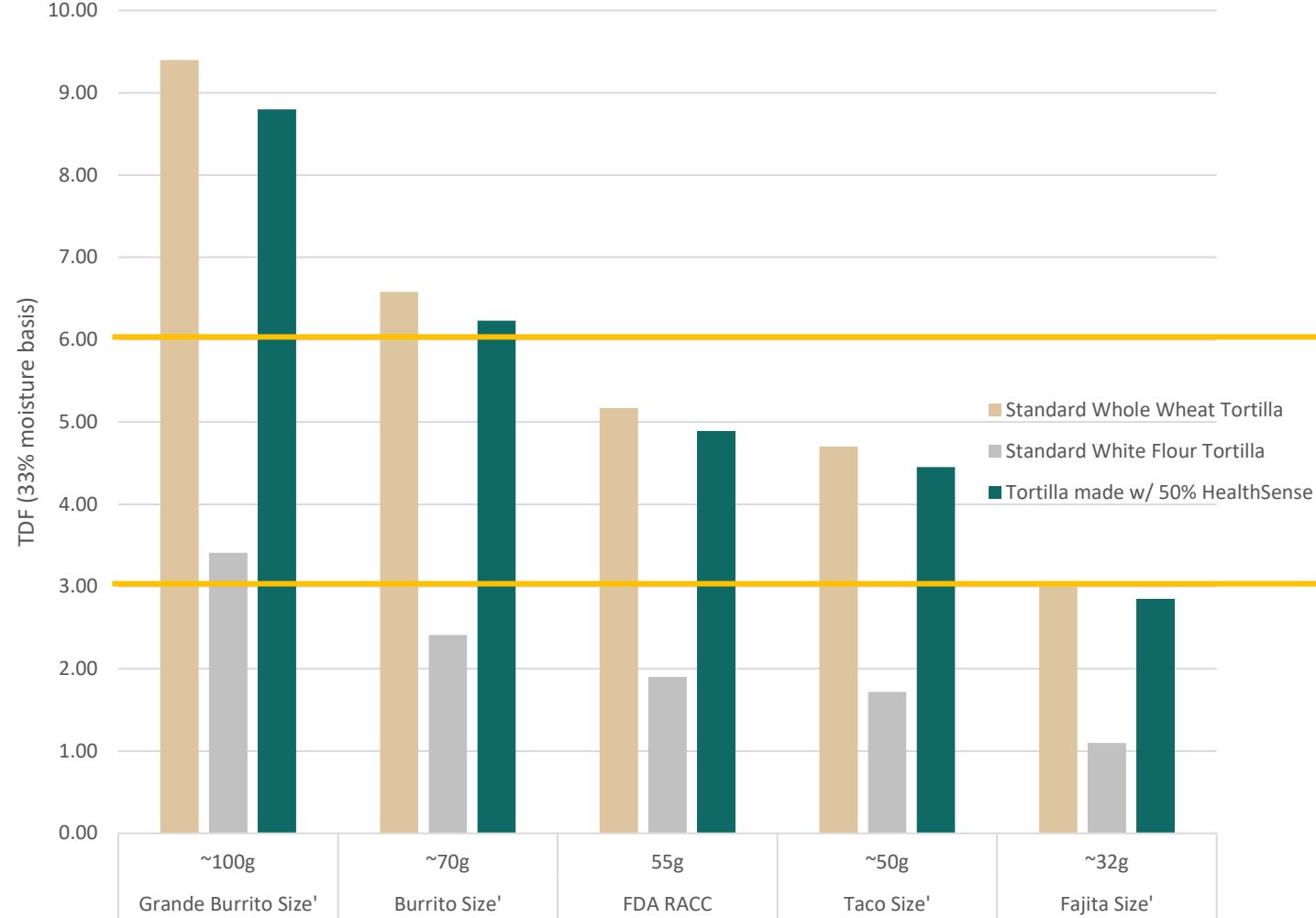
- Fermentable dietary fibers that selectively change the gut microbiota, and, beneficial to health

Definition of Resistant Starch Fiber:

- Resistant starch fiber passes through the small intestine undigested and travels to the large intestine where it is fermented by our resident bacteria.
 - Reduces the amount of digestible carbohydrate in the small intestine; lowers glycemic response
 - Fermentation by resident bacteria produces beneficial short chain fatty acids (SCFA) (butyrate, propionate, acetate)
 - While starch is normally digested via alpha-amylase enzymes, Resistant Starch Fiber is NOT.

Serving size matters when making fiber claims

Fiber Content of various tortilla sizes



Excellent source of fiber:
6g/55g RACC and serving*

Good source of fiber:
3g/55g RACC and serving*

* Fiber data:



White Flour Tortilla; USDA #1100858
 Whole Wheat Tortilla; USDA #1100859
 0% HealthSense Tortilla; average of 5 internally-collected data points. 5 different tortilla formulations/manufacturing processes represented from customer work



Analysis Method is Critical for Fiber Claims

- Different analysis methods will measure different components of dietary fiber, based on solubility and molecular weight
- Choose the analysis method that will measure the type of fiber used in your formulation
- Selecting the wrong method from an external lab may result in incorrect fiber labeling-Too Low or Too High

AOAC Method	Megazyme Product	Soluble DF				Insoluble DF	Problems/Issues	
		Total Dietary Fiber		SDFP	IDF		Underestimated	Overestimated
		HMWDF	SDFS					
985.29	K-TDFR	✓	×	×	×	RS ₂ , RS ₃	RS ₄	
991.43		×	×	✓	✓			
2001.03	Individual Enzymes ⁺	✓	✓	×	×			
2009.01	K-INTDF	✓	✓	×	×	RS ₂ , RS ₄ , FOS	High non-resistant starch content (very minor)	
2011.25		×	✓	✓	✓			
2017.16	K-RINTDF	✓	✓	×	×	NONE	NONE	
2017.16*		×	✓	✓	✓			

Example:

	TDF based on 38% moisture using AOAC 991.43	TDF based on 38% moisture using AOAC 2009.01 or 2011.25	TDF based on 38% moisture using AOAC 2017.16
Bread made with High Amylose Wheat Flour	<6%	6-8%	7-9%

Consider Functionality when Choosing Fiber

Dough-making characteristics

- Forms doughs that are extensible and machinable (not sticky)

Finished product characteristics

- No impact to softness or rollability over shelf life for positive consumer experience
- Minimal degradation in the manufacturing process to enable claims and optimize cost

Sensory and visual characteristics

- No differences in color, flavor, or overall eating quality compared to a traditional wheat-based products

Dough made from wheat flour



Dough made with fiber additives



Dough made with High Amylose Flour



Positioning Tortillas with Fiber

A fiber containing tortilla can be positioned different ways depending on the amount and type of fiber used

- Fiber fortification and carb reduction:** *5X the fiber OR 5 grams fewer carbs of traditional*
- Digestive or Gut health benefits:** *Helps maintain a health digestive system*
- Keto-friendly or low net carb:** *Depends on carb reduction*
- Clean label:** *Depends on fiber used*
- Permissibly indulgent:** *If it tastes great*
- Better-for-you:** *Not too technical*



Select the best Fiber based on the Job to be Done

Used 1-3 as ratings. Higher numbers always correlate to a better/more positive outcome

Ingredient Name	High Amylose Flour	Oat Fiber	Modified Wheat Starch	Resistant Corn Starch	Oat Fiber/Inulin Blend
Total Dietary Fiber in Ingredient (%)	32%	91%	80%	56%	91% (Oat Fiber) 93% (Inulin)
Job #1: Enhance product nutrition	3	3	3	3	3
Marketable health message - immunity	3	2	3	3	3
Marketable health message - prebiotic	3	2	3	3	3
Marketable health message - gut/digestive health	3	2	3	3	3
Marketable health message - blood sugar mgmt	3	3	3	3	3
Job #2: Enhance product marketing					
Clean label	3	3	1	1	2
Whole food source of fiber	3	1	1	1	1
Compelling origin story	3	1	1	1	1
Job #3: Maintain operational + \$ parity					
Bowl cost	2	3	2	1	3
Maintain and/or increase dough yield	2	3	2	2	3
Maintain operation efficiency	3	3	3	3	3
Minimal product development needed	3	3	2	2	2
Job #4: Sensory + Appearance					
Tortilla appearance	3	2	3	3	2
Flavor/aroma of tortilla	3	3	3	3	3
Texture of tortilla	3	2	3	3	3

Thank you!

HEALTHSENSE®

— HIGH FIBER WHEAT FLOUR —

A GROUND-BREAKING WHOLE FOOD SOLUTION
FOR BETTER NUTRITION DIRECTLY FROM THE FARM

Bay State Milling