
CLEAN LABEL
Bay State Milling
HEALTHSENSE®
HIGH FIBER WHEAT FLOUR
A GROUND-BREAKING WHOLE FOOD SOLUTION
FOR BETTER NUTRITION DIRECTLY FROM THE FARM
Clean Label Conference
May 24-25, 2022

Breakthrough Fiber Source, Directly From the Farm!

HEALTHSENSE®

HIGH FIBER WHEAT FLOUR

Delivers up to **5X the amount of fiber** in a finished product compared to traditional wheat flour

PREBIOTIC POWER

Naturally occurring resistant starch fiber to **nourish gut health**

CLEAN LABEL & WHOLE FOOD

Labels simply as wheat, allowing a reduction or replacement of fiber additives

SENSORY & FUNCTIONALITY

Same **great taste, texture** and performance of white refined flour with nutritional chops of whole wheat flour

EXCELLENT SOURCE OF FIBER

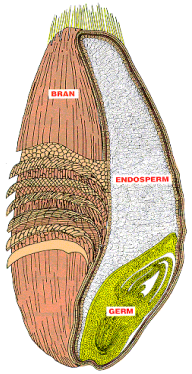
USDA ORGANIC

NON GMO Project VERIFIED

HealthSense™ High Fiber Flour is derived from High Amylose Wheat–a whole food source of fiber.

Conventional Wheat

Bran (14%):
43% Fiber



Endosperm (83%):
2-3% Fiber

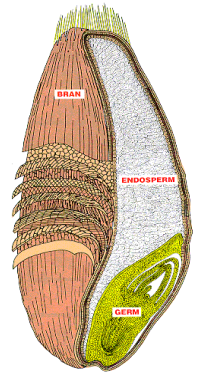
Majority of endosperm is digestible starch

Germ (3%):
13% Fiber

Major fibers/NSP found in wheat kernel[5]:
- Arabinoxylans
- Cellulose
- Beta-Glucan

High Amylose Wheat (HAW)

Bran (14%):
43% Fiber



Endosperm (83%):
30%+ Fiber

Majority of endosperm is resistant starch

Germ (3%):
13% Fiber

Major fibers/NSP found in wheat kernel[2]:
- Resistant starch*
- Arabinoxylans
- Cellulose
- Beta-Glucan

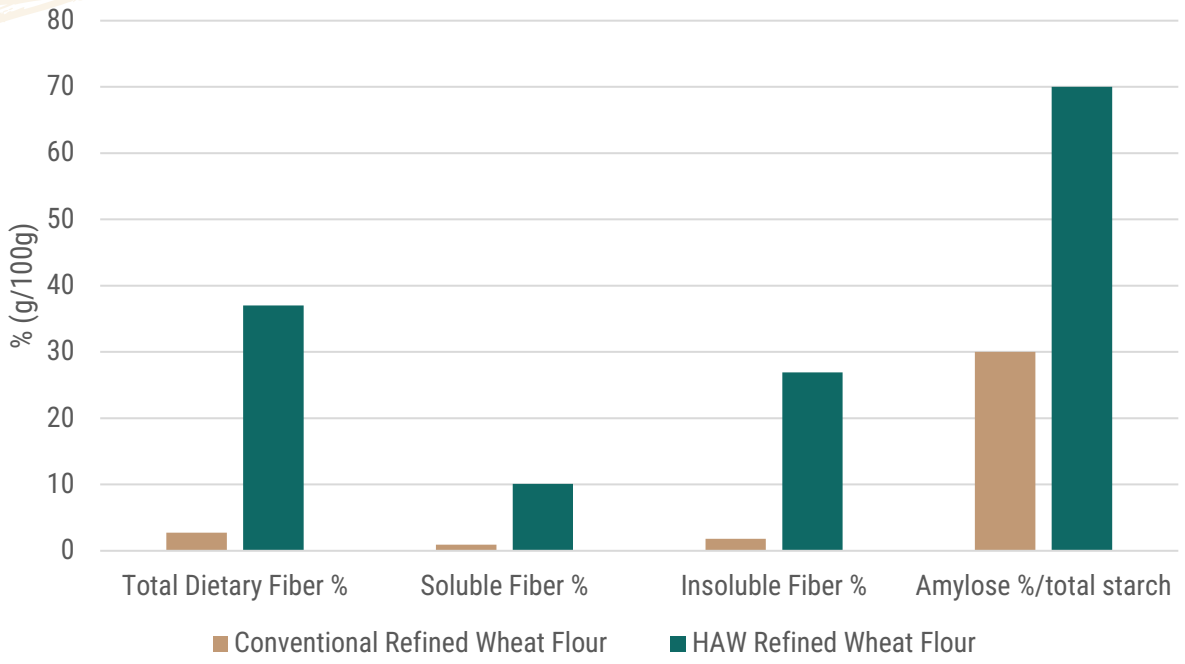
No need to compromise to close the fiber gap!

HEALTHSENSE®

Ten times the fiber of common wheat

HEALTHSENSE®

HealthSense delivers a balance of fibers, including intrinsic prebiotic resistant starch.



Resistant Starch Type	Mechanism
1	Physically inaccessible to enzymes due to the presence of bran & germ
2	Inaccessible to enzymes due to the presence of ungelatinized starch tightly packed within the granule
3	Inaccessible to enzymes due to the crystalline structure formed when starch is retrograded
4	Chemically modified to resist digestion
5	Inaccessible to enzymes due to the presence of a complex between fat and gelatinized starch

AOAC 2017.19 method of fiber analysis must be used to capture all fiber sources in TDF.

HealthSense offers a range of benefits Across a Variety of Applications

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Nutritional Improvements Comparison Using HealthSense™ Flour at 50% of Total Flour

	Fiber Content (g/serv)		Net Carb Content (g/serv)	
	50% HS	% change*	50% HS	% Change*
Flour	6	600	16	-28
White Bread	4	300	21	-13
Tortillas	4	300	23	-12
Pasta	7	250	34	-13
Mac & Cheese	10	400	37	-18
Pizza Crust	4	300	21	-13
Pancakes	4	100	35	-5
Crackers	3	100	8	-28

Calories per serving can also be reduced by an average of 10% per serving using RACC.

HealthSense is the clean label option for fiber enhanced flour based foods.

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HealthSense Flour can be readily substituted for traditional flour and requires no formulation adjustments to deliver a fiber-enhanced bread, pizza, tortilla, etc with the same eating quality of its traditional counterpart.

- **The predominant formula adjustment required is additional water**
- **The fiber in HealthSense does not weight down a bread formula like isolated fibers**
  - **Oat Fiber, Modified Wheat Starch, and Cellulose often require the inclusion of other ingredients (vital wheat gluten, enzymes, other dough conditioners, etc.) to achieve the same eating quality of a traditional white bread.**
    - **These add significant costs to the finished product and expand ingredient declarations**

HealthSense is wheat flour and is labelled as wheat flour in the ingredient declaration.

Just add water!

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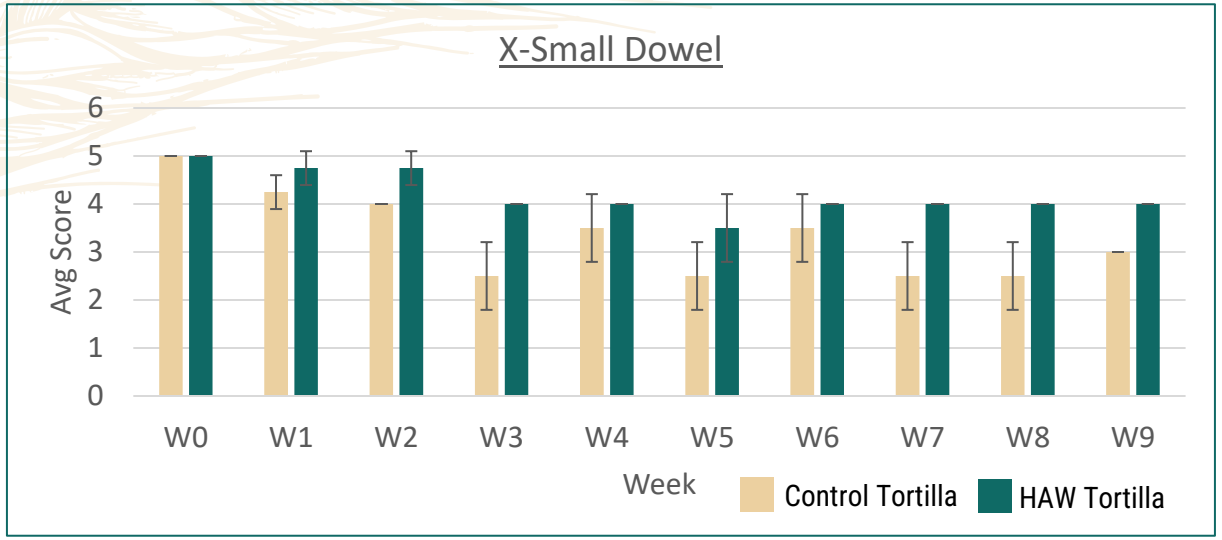
Product Category	Application Examples	Recommended MAX HealthSense Inclusion (Flour Weight Basis)[1]	Suggested Absorption Increase[1]	Assumed Fiber Increase w/ HealthSense Flour[1,2]
Yeast-raised dough-based systems	Commercial pan breads, artisan-style breads, rolls, etc.	25%	4-8%	≥3X
Chemically-leavened dough-based systems	Commercial tortillas, flatbreads, shelf-stable pizza crusts, etc.	50%	8-12%	≥4X
Yeast-raised sweet dough-based systems	Danish pastry, yeast-raised donuts, etc.	25%	4-8%	≥3X
Chemically-leavened flour-based batter systems	Pancakes, waffles, quick-breads, cake donuts, cookies, etc.	25%	4-10%	≥2X
Chemically-leavened sugar/fat-based batter systems	Cakes, muffins, brownies, cookies, pie crusts, etc.	25%	4-10%	≥2X

[1]Guidance based on lab formulations
[2] Analysis completed at BSM internal lab using AOAC 2017.16

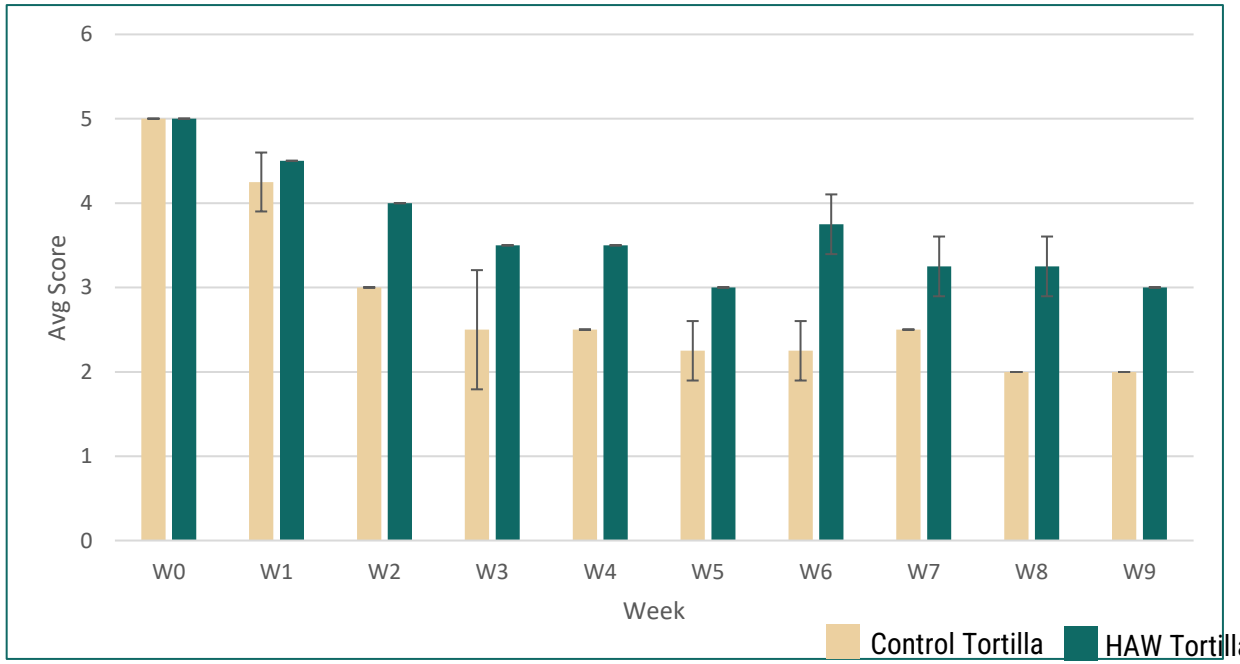
HealthSense enables improved quality over shelf life

Rollability



Control Tortilla vs. HS Tortilla change in rollability over 9 weeks (P<0.05).

Foldability



Control Tortilla vs. HS Tortilla change in foldability over 9 weeks (P<0.05)

Product Concept:
BFY Tortillas

Capitalize on the $1.9bn tortilla market with a differentiated wheat-based version

6x the FIBER
of a traditional tortilla

Promote same
GREAT TASTE & FLEXIBLE TEXTURE

PREBIOTIC FIBER
Supports gut health & immunity

IMPROVED ROLLABILITY
based on internal BSM evaluations

CLEAN LABEL
HealthSense labels as "**wheat flour**"

HEALTHSENSE®

TRADITIONAL

	50g	% daily value
Calories	120	
Total Carbohydrate	21g	8%
Dietary Fiber	1g	1%
Protein	3g	
Net Carbs	20g	

IMPROVED NUTRITIONALS *

	50g	% daily value
Calories	**100**	
Total Carbohydrate	**20g**	**8%**
Dietary Fiber	**6g**	**20%**
Protein	**4g**	
Net Carbs	**14g**	

[*] Based on 100% HealthSense

Processing Advantages

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In addition to delivering more dietary fiber, HealthSense flour also provides **enhanced functionality**:

- Dough-making characteristics
  - Improves dough **extensibility** (i.e., minimizes dough springback)
  - Improves dough **machinability**
  - Optimal **water absorption** to avoid sticking to the tortilla press
- Finished product characteristics
  - Enhanced **rollability** and **foldability** over shelf life
  - No differences in **color** compared to a traditional tortilla
  - No differences in **flavor** or overall eating quality compared to a traditional tortilla
- Better **cost-in-use**
  - Typical isolated fiber ingredients cost more than $2/lb, and are not compatible with **clean label**

Demonstrated reduced glycemic response

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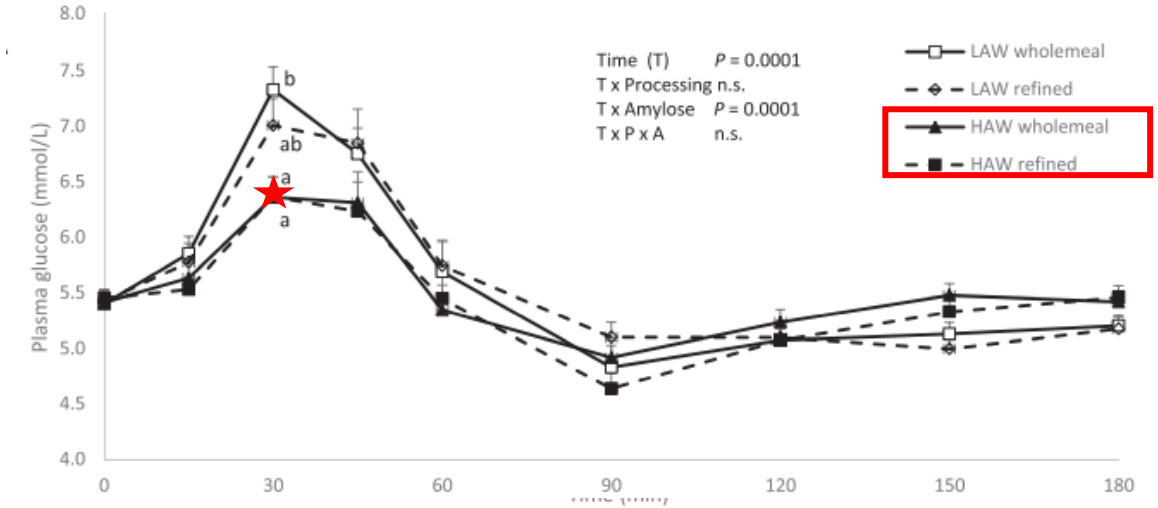
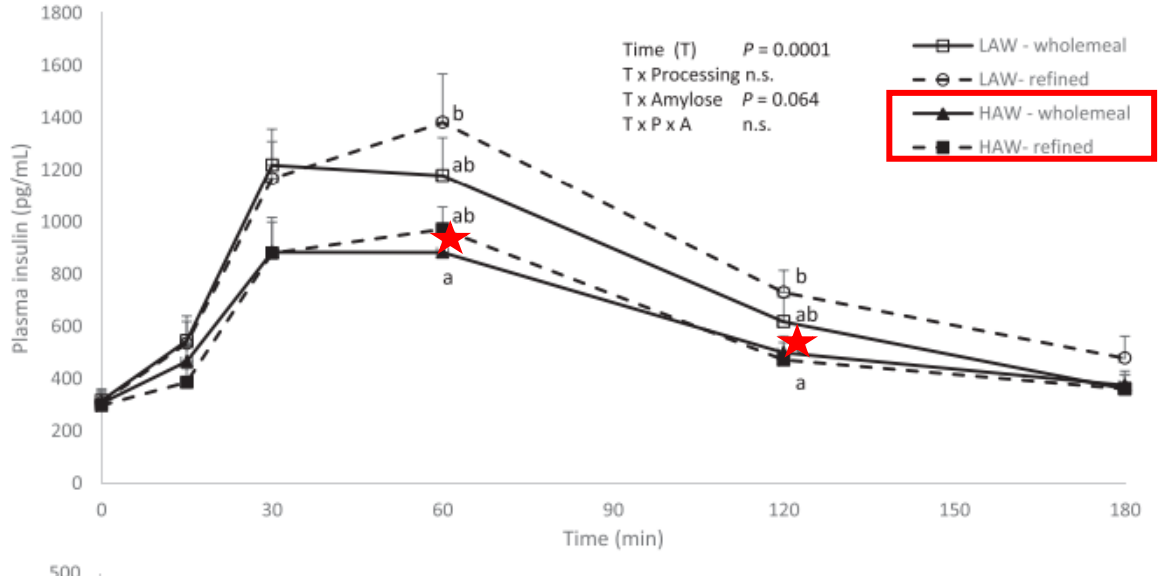
Study design

- 7-week test period: 7 food challenges administrated over 7 consecutive weekly visits
  - Three challenges: Participants consumed 300 mL glucose drink
  - Four challenges: Participants consumed 121g bread made with:
    - Low amylose wheat (LAW); refined
    - LAW; whole wheat
    - HAW; refined
    - HAW; whole wheat

Results

- Consumption of HAW products resulted in 39% lower glycemic AUC response (p=0.001)
- Consumption of HAW products resulted in 24% lower insulinemic AUC response (p=0.008)





Also been shown to have prebiotic effects

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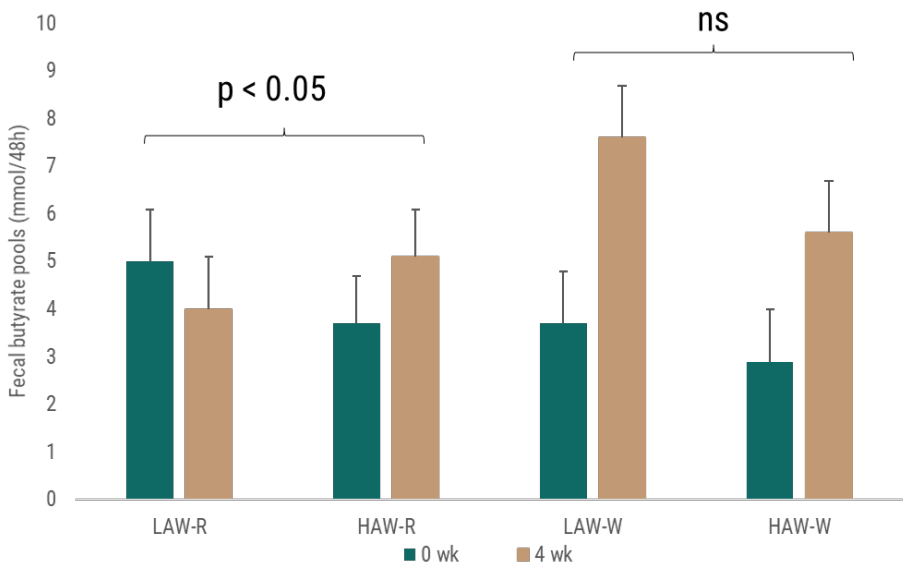
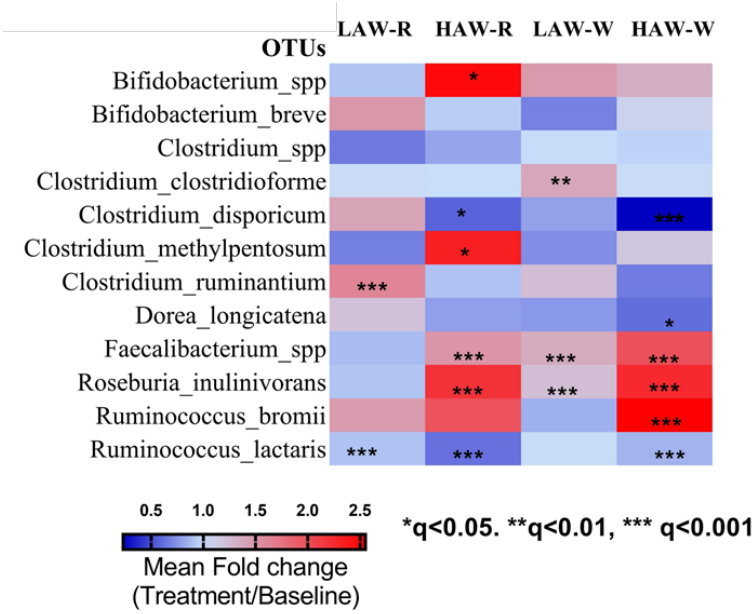
Study design

- 2-week low fiber diet (<20 g/day)
- 4-week test period; consume bread (160g/day) and biscuits (75 g/day) daily made with:
  - LAW; refined. n=20
  - LAW; whole wheat. n=20
  - HAW; refined. n=20
  - HAW; whole wheat . n=20



Results

- When consuming products made with refined HAW vs. refined LAW flour participants showed
  - Increased fecal butyrate excretion (38% increase vs. baseline, p<0.05)
  - Increased number of butyrate-producing bacteria: *Faecalibacterium spp* and *Roseburia inulinivorans*
  - Increased number of SCFA-producing bacteria: *Bifidobacterium spp, Clostridium methylpentosum, Ruminococcus bromii*
  - Reduced fecal p-cresol and a putrefactive bacteria species *Peptostreptococcacea*



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HealthSense at Center of Various Consumer Trends