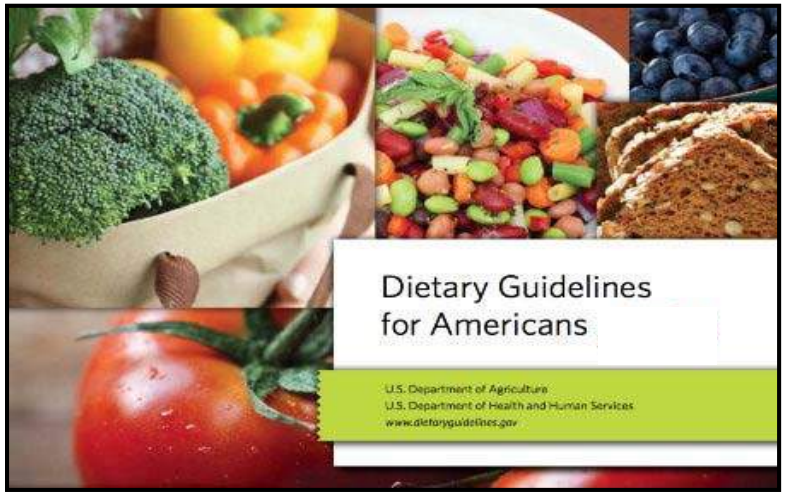
Sprouted Grains –

Technology, Uses and Health Benefits

Gang Guo, PhD; Ardent Mills, LLC

Changing regulations are changing consumption



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Consumer landscape

- Seeking H&W

  - Roughly six in 10 make an effort to consume fiber, whole grains & protein
  - *(2013 IFIC Food & Health Survey)*

1. Whole Grain nutrition
2. Increased fiber (delivered through whole grains/whole wheat)
3. Clean Label

"Whole Wheat Flour"

vs.

"Enriched Wheat Flour (Flour, Niacin, Reduced Iron, Thiamine Mononitrate [Vitamin B1], Riboflavin [Vitamin b2], Folic Acid)

- Blasted by negative messages

  - Grain-based foods increasingly receiving negative coverage

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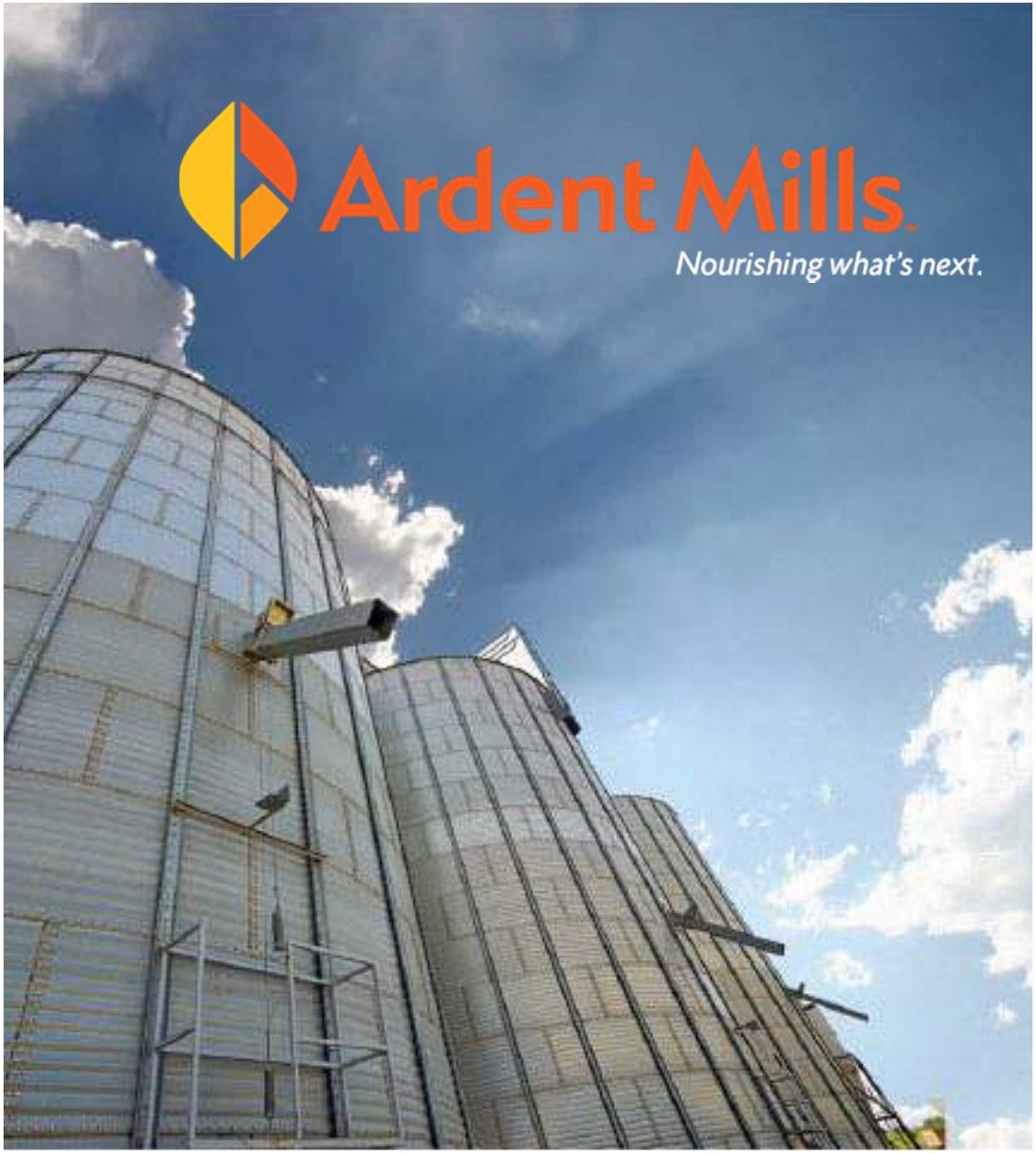


OUR VISION:

Ardent Mills is the **TRUSTED** partner in nurturing our customers, consumers and communities through innovative and nutritious grain-based solutions.

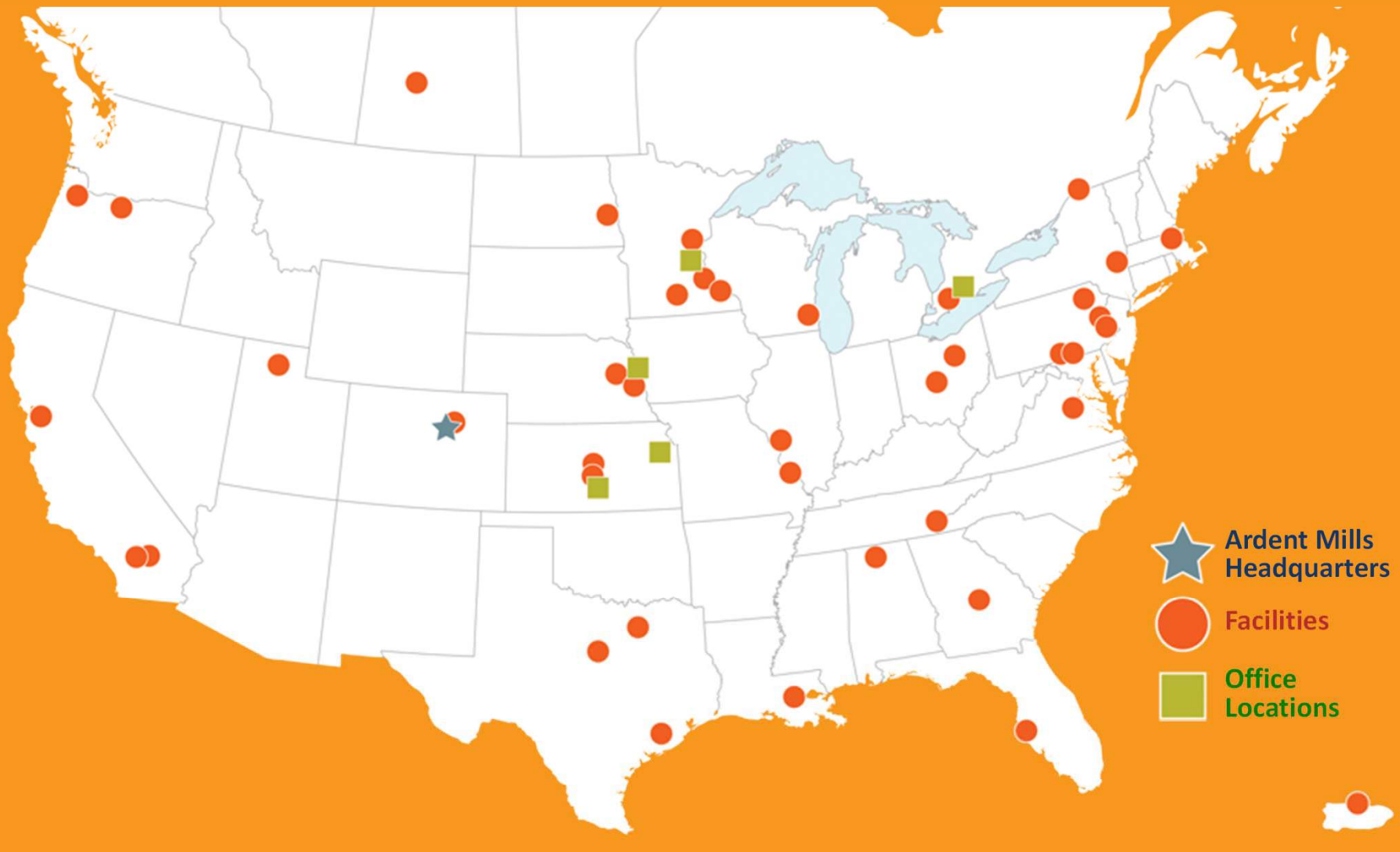
OUR VALUES:

We will make a positive impact with our employees, customers, communities and partners by:

- **Working to earn TRUST every day, always operating with reliability and integrity.**
- **SERVING others with understanding, respect and care.**
- **Operating with SIMPLICITY, clarity and transparency, removing barriers and letting people do what they do best.**
- **Ensuring the SAFETY of our products and people; doing what's best to create the safest environment now and for the future.**

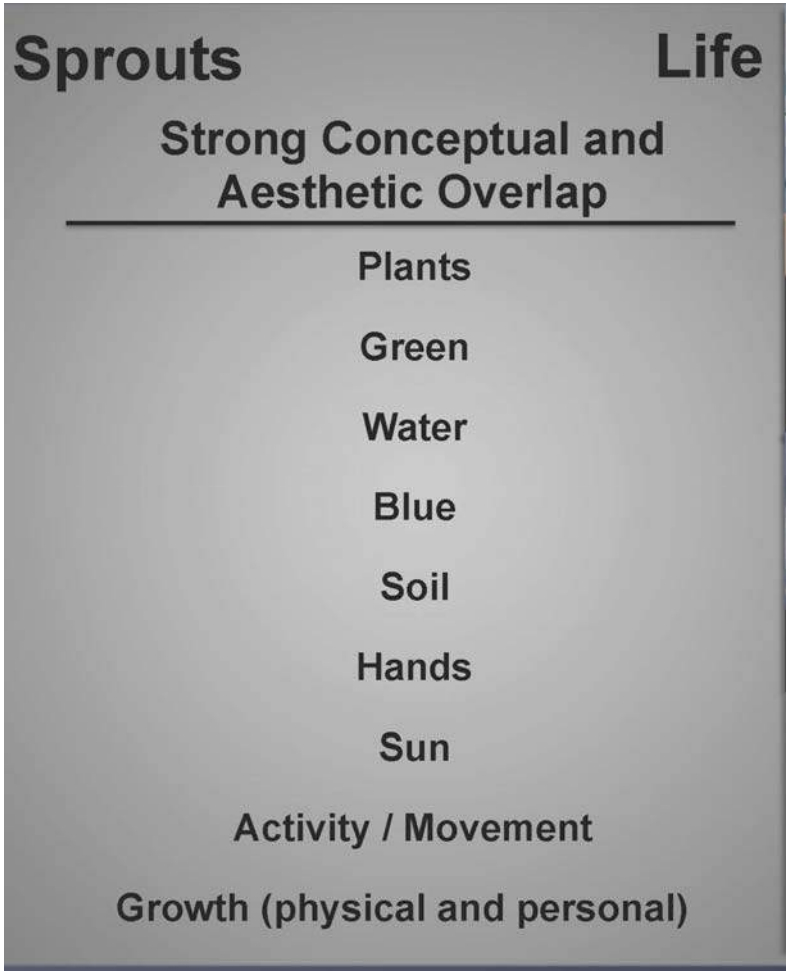
ENHANCING THE QUALITY OF LIFE AND STANDARD OF HEALTH

Coast to Coast Supply Assurance and Delivery Efficiency



Why Sprouted Grains?

Sprouting Makes Grains Come To Life



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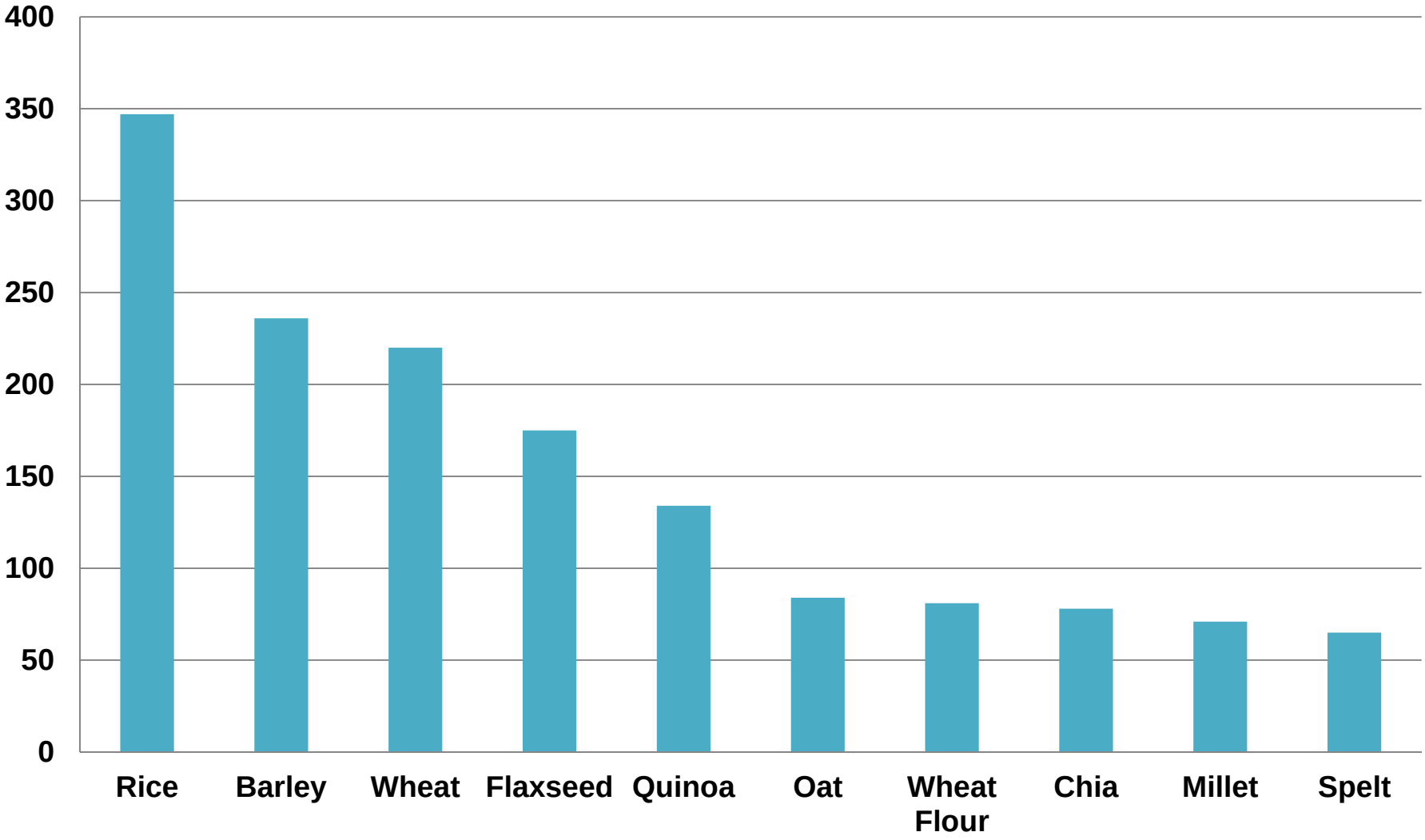
Top Sprouted Grains in New Products in the U.S. 2004 - 2014



Source: Innova Database

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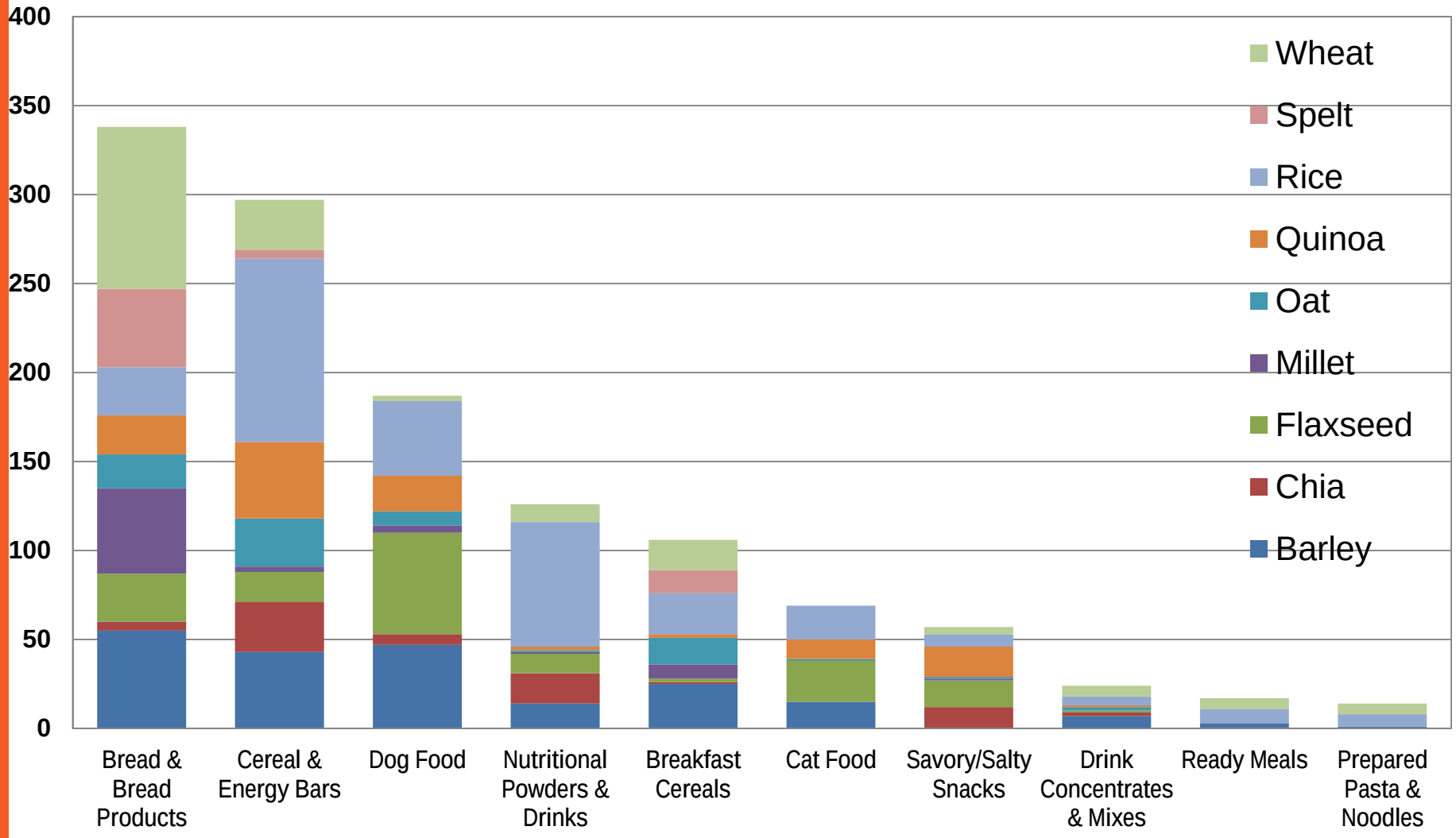
Top Sprouted Grains used by Category between 2004 and 2014



Source: Innova Database

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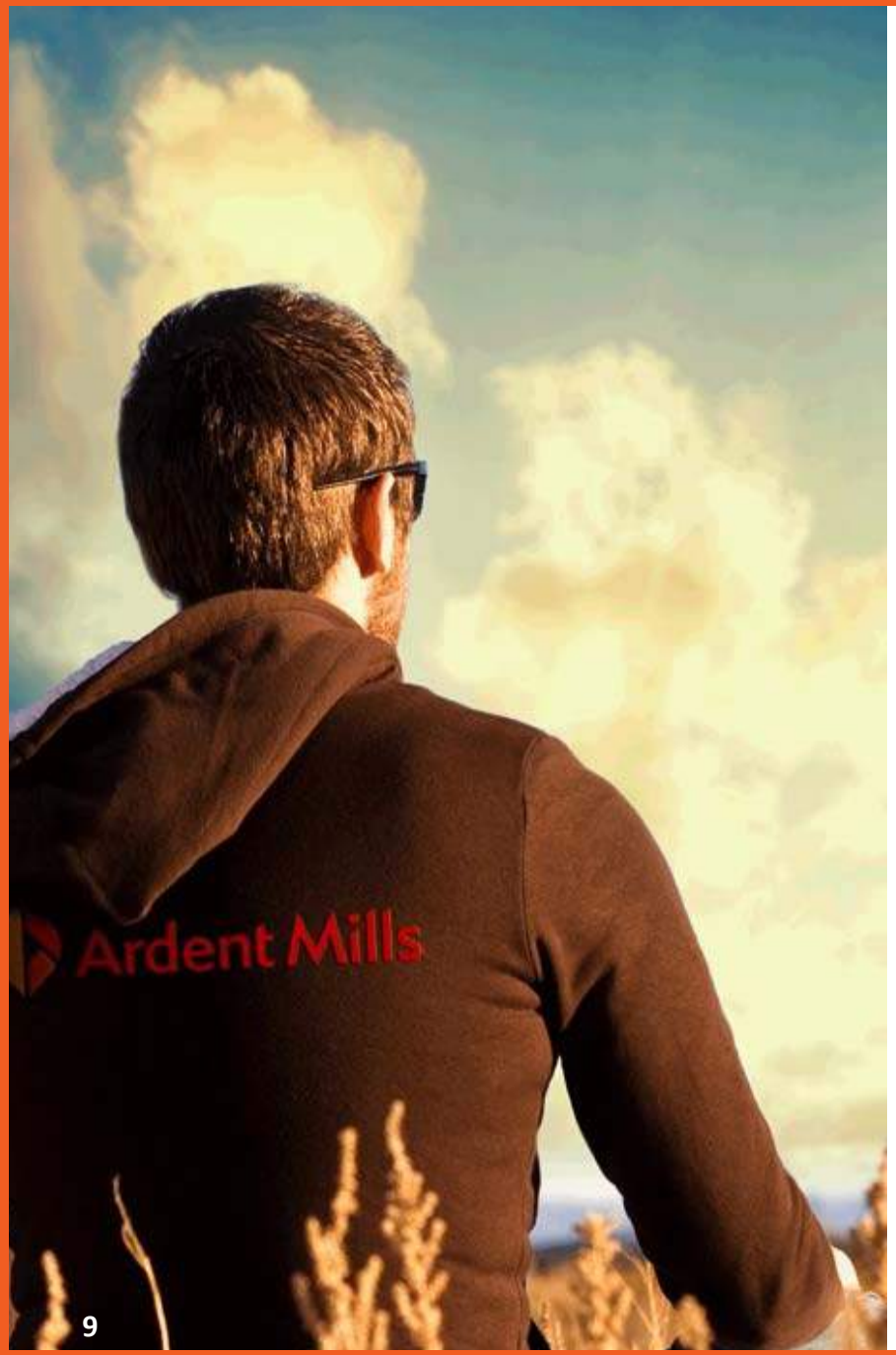

Do & Don't List

✓ Sprouted Grains

- Baking/Cooking Applications
- Not for Brewing Applications

x Grain Sprouts

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Sprouted Grain Definition

- Wikipedia / Dictionary
- No regulated definition of “sprouted grain”
- Essential Eating Sprouted Foods: ½ original FN
- AACCI: "Malted or sprouted grains containing ***all*** of the original bran, germ, and endosperm shall be considered whole grains as long as ***sprout growth does not exceed kernel length*** and ***nutrient values have not diminished***. These grains should be labeled as malted or ***sprouted whole grain***."

Grain Sprouting Process

- Steeping

  Impacts: Nutrient Profile & Enzyme Activity

  By varying: Temperature, stages, length, pH

  Opportunity
  reduce Phytate

- Germination

  Impacts: Modification (physiological and biochemical)

  By varying: Temperature, stages, length, pH , Aeration

  Opportunity
  increase sugars &nutrients

- Kilning
  - *Impacts:* Aroma, flavor, texture, color, enzyme
  - *By varying:* temperature, length, aeration

  Opportunity
  Increased nutty character or sweetness

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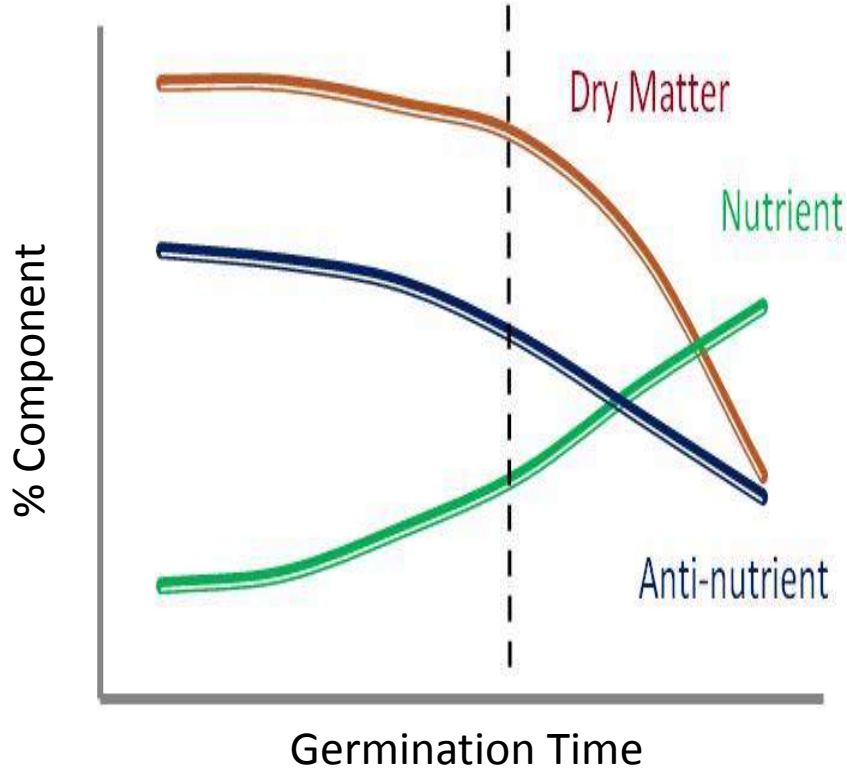
Ardent Mills Sprouted White Spring Whole Wheat



Success Criteria
1. Wheat Moisture
2. WW Flour FN
3. Wheat Kernel Stabilization
4. No Gluten Protein Damage
5. Micro Control – GMPs

100% Whole Wheat / 100% Sprouted / WW Bread Applications / Better Taste / Better Baking Performance

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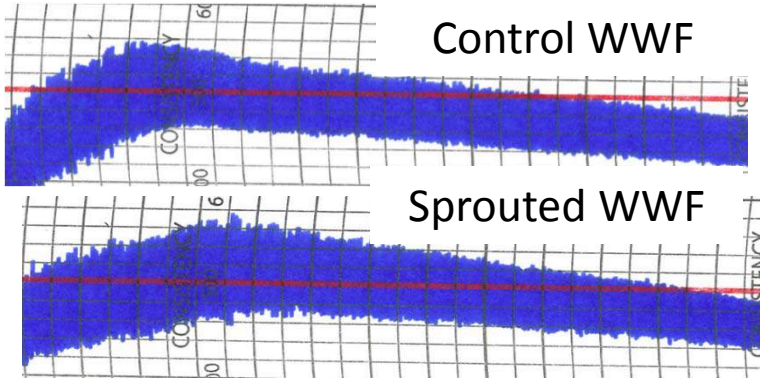
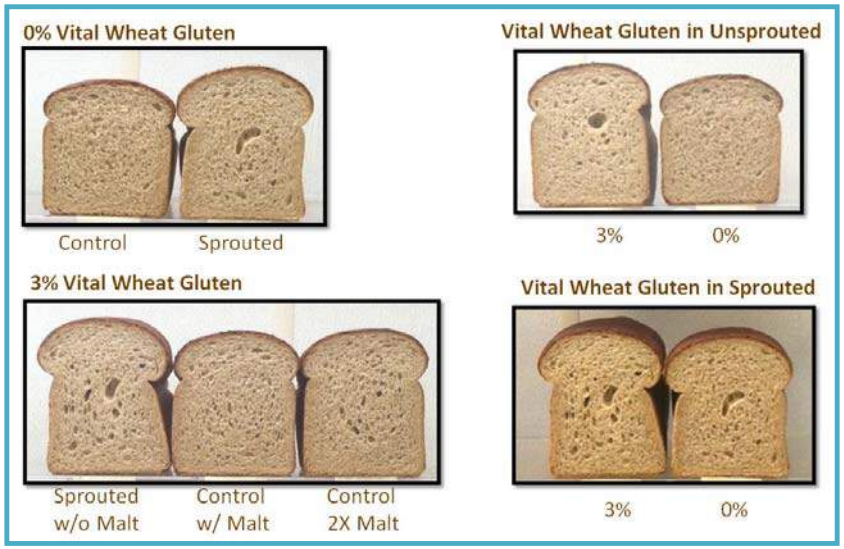
Ardent Mills Sprouted White Spring WWF

SPROUTED

WHITE SPRING WHOLE WHEAT FLOUR

Better volume, less proofing and greater stability





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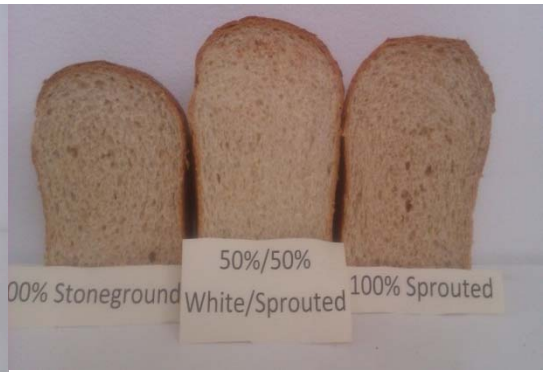
Ardent Mills Sprouted White Spring WWF

Allied Mills

The overall finished bake loaf of the 100% sprouted flour in volume, texture and tolerance was ***superior*** to the stoneground baked loaf. Blended with standard bakers flour, texture and volume was improved.

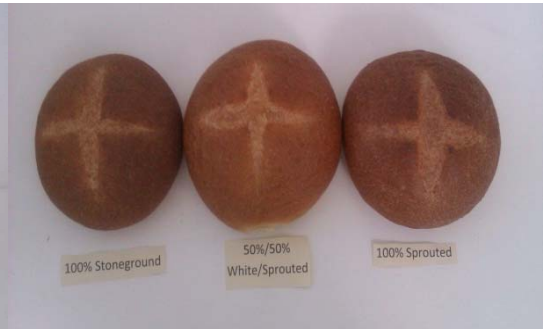
Hi Top

Hi Top Slice



Hi Top Dropped

Cobbs



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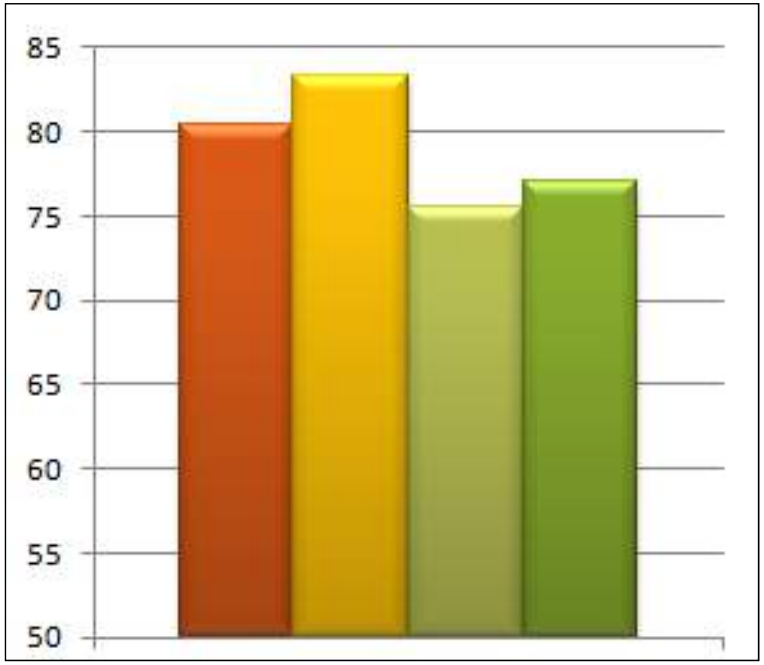
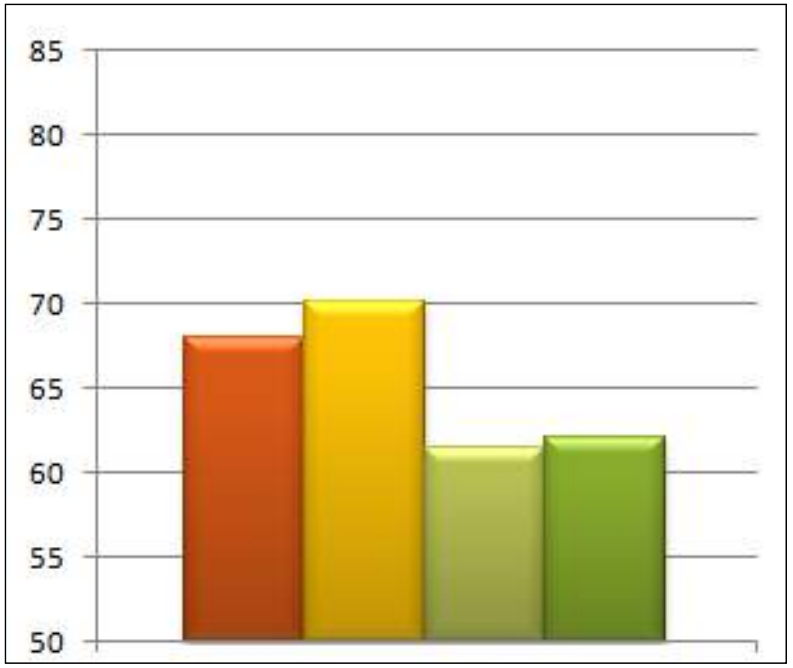
Ardent Mills Sprouted White Spring WWF

FLOUR color (Whiteness L* Values)



BREAD CRUMB color (Whiteness L* Values)



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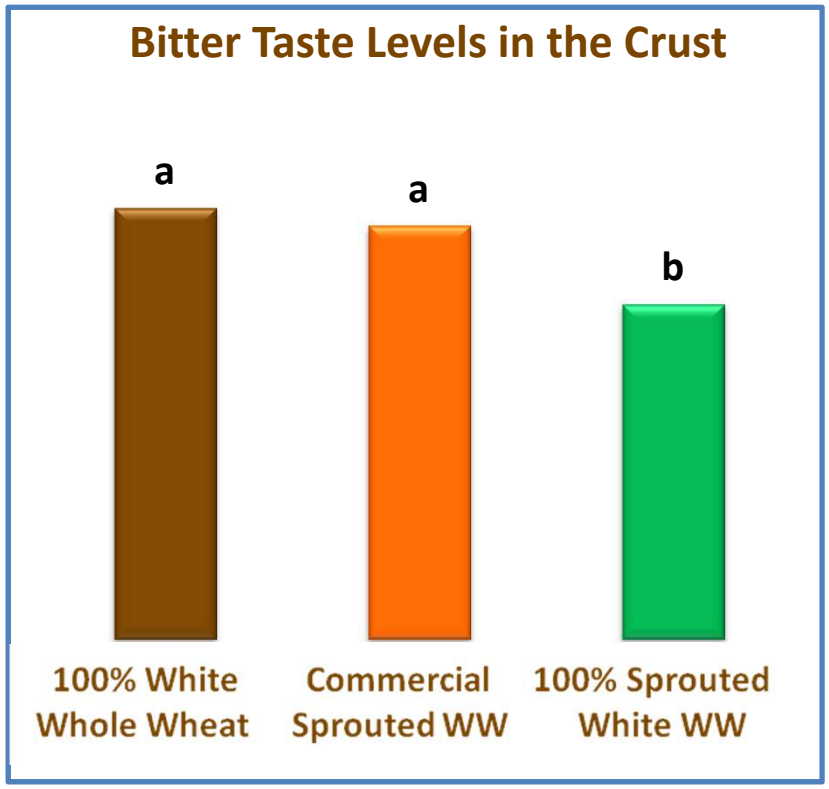
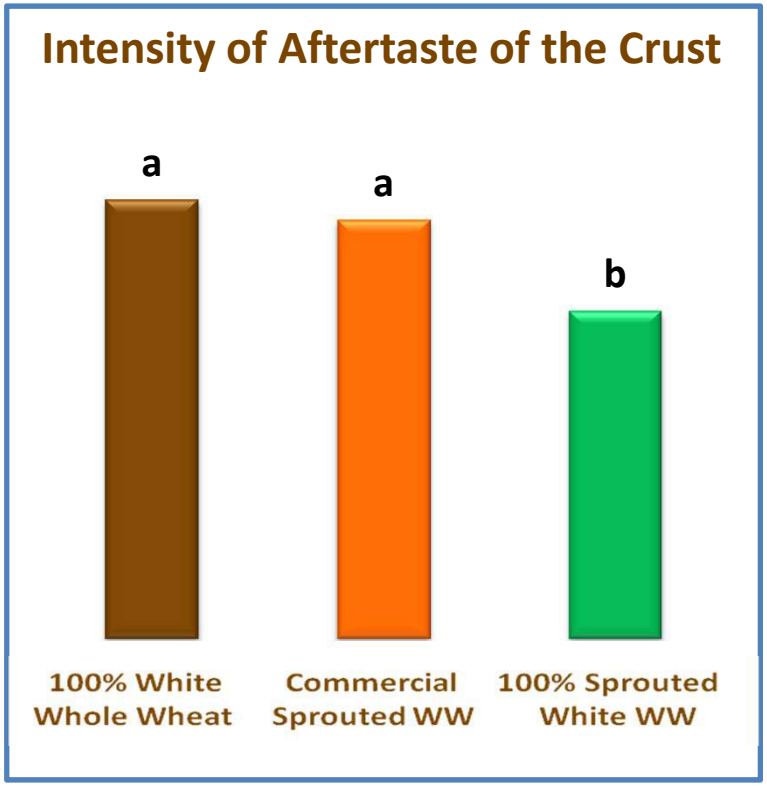
Ardent Mills Sprouted White Spring WWF

Consumer CLT Results (n=99)





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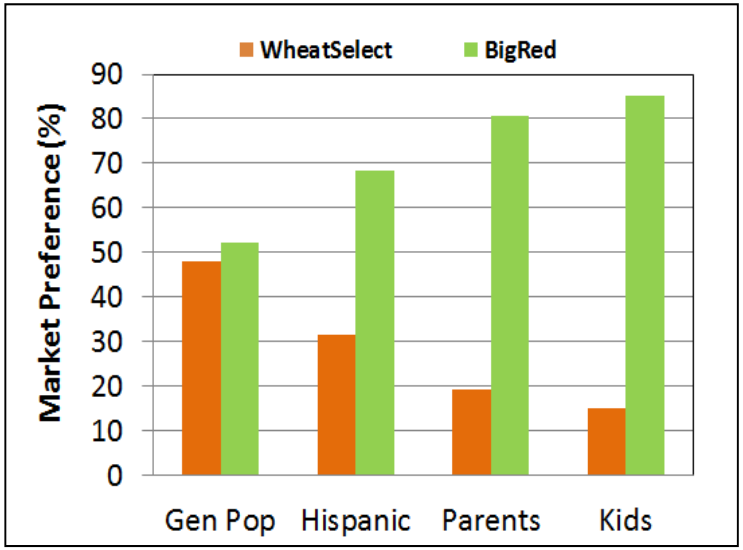
Ardent Mills Sprouted White Spring WWF

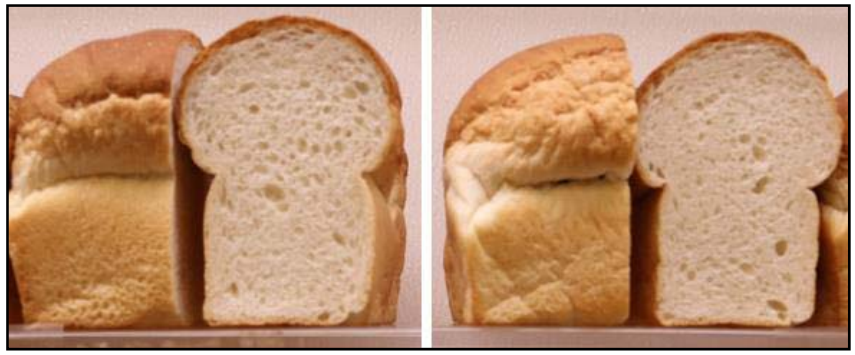
NC STATE UNIVERSITY Sensory Service Center

Here are a few BREADS you might like. For each one, indicate whether it is a possibility or not.

(1 of 18)

Crust			
Crumb			
Crust Texture	Soft	Soft	Hard
Crumb Texture	Compressible	Soft	Dense
Label Claim	All natural	No artificial ingredients or preservatives	All natural
Flavor/Taste	Sweet	Mild	Sweet
Price	$5.49	$4.99	$4.49
	○ A possibility ○ Won't work for me	○ A possibility ○ Won't work for me	○ A possibility ○ Won't work for me





Unsprouted Control 100% Refined Sprouted

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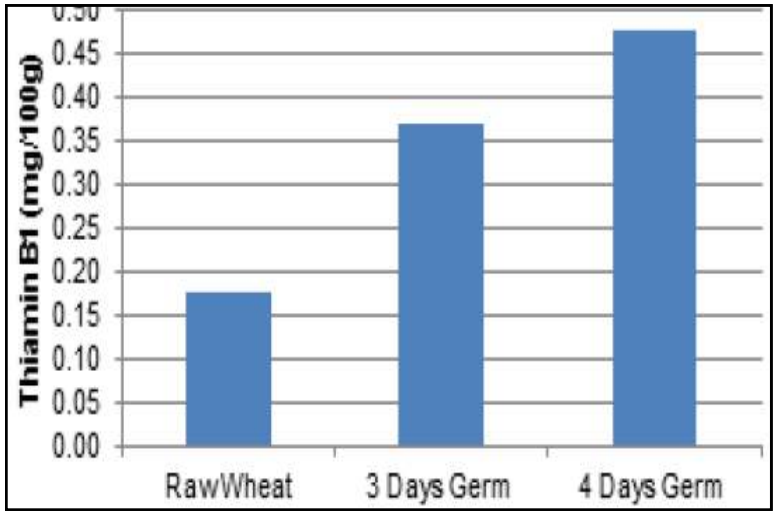
NEXT GEN 2:

Sprouting of Wheat & Pulses Improves Nutrient, Flavor, Color and Taste …

WHEAT FLOUR: Effect of 4 days of germination on Thiamin (B1)



100% wheat flour (Control) – left;
100% sprouted wheat flour with light kilning - middle
100% sprouted wheat flour with heavy kilning - right

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Pros and Cons

- ✓ Pros/Goals
  1) Market Trends/H&W Halo
  2) Better Sensory/Acceptance
  3) Increased Nutrients
  4) Decreased Anti-nutrients
  5) Better Baking Performance

- ✓ Cons/Risk
  - Food Safety
  - FDA: Guidance for Industry: Reducing Microbial Food Safety Hazards For Sprouted Seeds

    Contains Nonbinding Recommendations

    October 27, 1999

    http://www.fda.gov/Food/GuidanceRegulation/GuidanceDocumentsRegulatoryInformation/ProducePlantProducts/ucm120244.htm

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Reduce Risk - Sprout Safety Alliance (SSA)

- **Working with the public-private Sprout Safety Alliance could carve out a niche for purity processing in the sprout world**

FDA

ILLINOIS INSTITUTE OF TECHNOLOGY

IFSH INSTITUTE FOR FOOD SAFETY AND HEALTH

Sprout Safety Alliance

A public-private alliance to develop a core curriculum, training and outreach programs for stakeholders in the sprout production community to enhance the industry's understanding and implementation of best practices for improving sprout safety…

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Nourishing what's next