



ConAgra Mills®

Product Development with Whole Grains

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Topics

- Whole grain dietary recommendations
- Strategies for whole grain product development
- Whole grain ingredients
- Communication to consumers

Dietary Guidelines for Americans 2010

- Focus on consuming nutrient dense foods
 - Whole grains
- Consume at least half of all grains as whole grains. Increase whole-grain intake by replacing refined grains with whole grains.
- Consumption of refined grain products that also are high in solid fats and/or added sugars should be reduced.



Whole Grain Foods are Needed

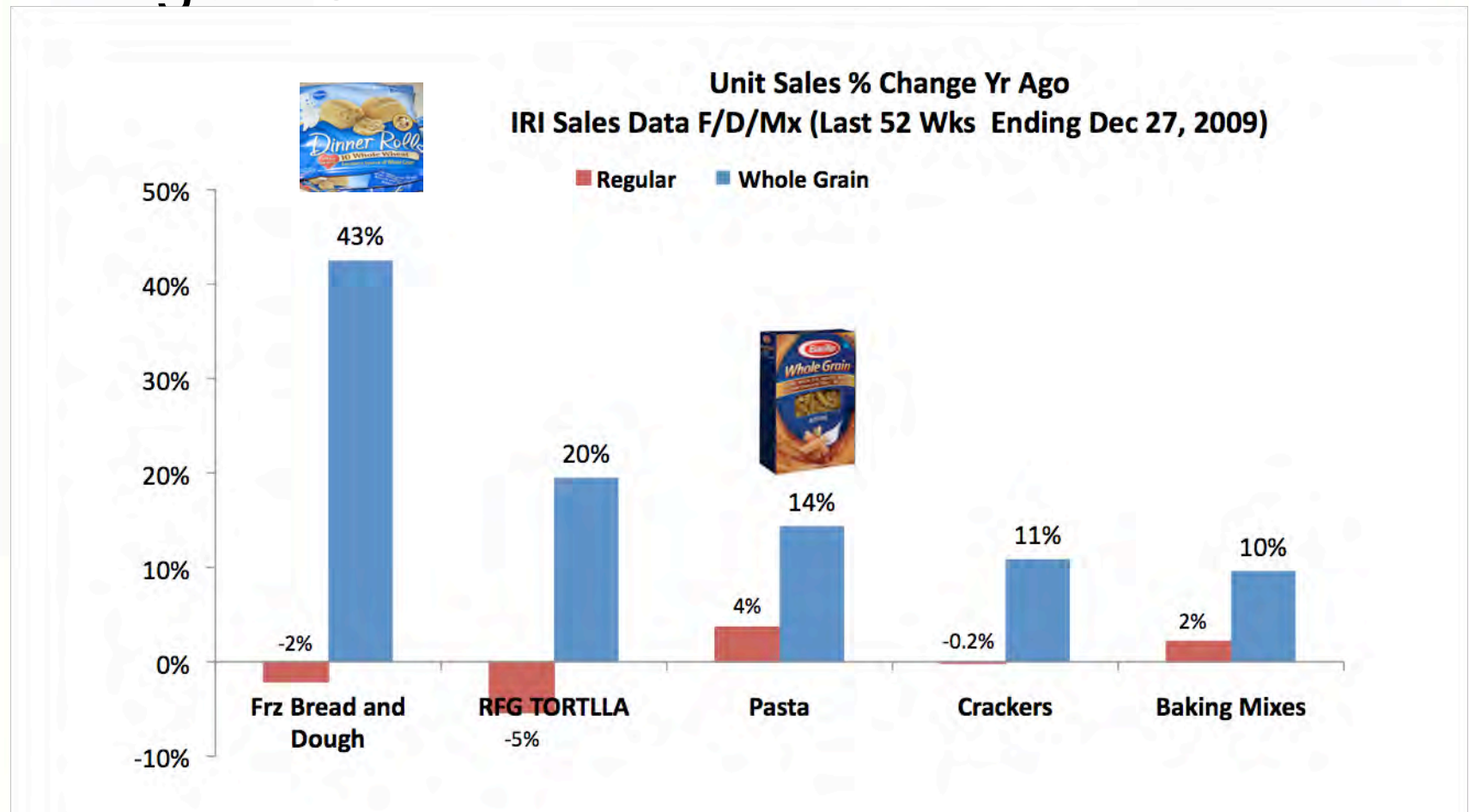
- Whole grains deliver significant quantities of several nutrients including fiber, B-vitamins, magnesium.
- There is considerable science support for the health & wellness benefits of whole grains.
- At least half of daily intake of grains should be from whole grain foods.
- Consumers aren't eating enough whole grain foods.

Whole Grain/Whole Wheat - Retail

Category	Whole Grain Unit Sales Millions	Whole Grain's Share within its Category
Cold RTE Cereal	1107.3	50.3%
Fresh Bread/ Rolls/ Buns	679.2	14.9%
Hot Cereal	92.9	30.0%
Snack Bars/ Granola Bars	78.9	8.0%
Dry Pasta	72.7	6.0%
Crackers	50.2	3.2%
Tortillas - refrigerated	9.0	6.2%
Cookies	7.3	0.4%
Flour	5.2	2.7%
Toaster Pastry	4.2	1.8%
Baking Mixes	3.7	0.5%
Salty Snacks	2.3	0.1%
Pancake Mix	1.9	1.8%
Frozen Bread/ Dough	0.8	0.3%

Source: IRI Retail Sales - 52 weeks ending Dec 27, 2009. Total grocery & mass merchandisers, excluding Wal Mart

Fastest Growing Whole Grain Retail Categories



Source: IRI Sales Data (Last 52 Wks Ending Dec 27, 2009) - Retail grocery, convenience stores, excluding Wal Mart

To Increase Consumption of Whole Grain Foods

- Optimize Taste
 - Flavor, color and texture
- Increase Availability of Whole Grain Foods
 - More whole grain foods needed
 - Whole grain food choices needed in all market segments
- Increase consumer awareness
- Control costs

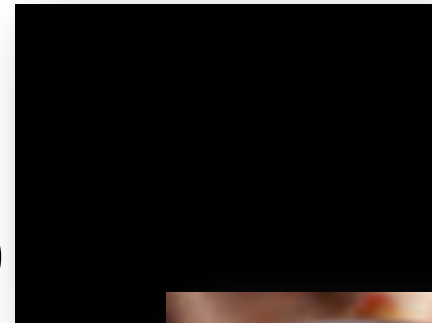
Product Development with Whole Grains



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Whole Grains are Versatile

- Baked goods (breads, tortillas, biscuits, muffins, quick breads)
- Pasta
- Pilaf side dishes
- Bars (granola, fruit & grain, etc.)
- Hot and ready-to-eat cereals
- Snacks – crackers, cookies
- Coatings, toppings
- Meats



There are Many Types of Grains

Recommended to FDA by AACCI Whole Grain Task Force 2006

- Cereal Grains

- Wheat (includes spelt, emmer, farro, einkorn, Kamut®, durum)
- Rice
- Corn (maize, popcorn)
- Oats
- Barley
- Rye
- Canary Seed
- Fonio
- Millet
- Wild Rice
- Triticale
- Sorghum
- Teff
- Job's Tears



- Pseudocereal Grains

- Amaranth, Buckwheat, Quinoa



Whole Grain Ingredient Considerations

- Grain Type - Hard or soft wheat, others grains, multigrain mixtures, gluten free
- Grain Seed Color - White, yellow, red, brown, black, purple
- Particle Size and Shape - Coarse, medium, fine, ultrafine flours, cracked, crushed, rolled, etc.
- Nutritional targets
 - Fiber level and type
 - Vitamins and minerals
 - Protein level and quality
 - Other phytonutrients
- Functionality
 - Fiber, protein, starch type and granule size
 - Processing – toasted, puffed, instantized, sprouted, etc.



Formulating Foods with Whole Grains

- Inclusion level – product attributes, nutrition/claims, processing
 - 15-30% minimal impact on product & processing; entry level claims
 - 51% stronger claims, can be good source fiber
 - 100% often good to excellent source of fiber
- Whole grains absorb more liquid
- Additional functional ingredients may be needed
- Processing conditions may require adjustment

Formulating Whole Grain Foods

- Add selected amounts of whole grains to popular grain-based foods – gradual approach

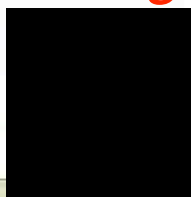
Ultrafine white whole wheat flour for stealth whole grain

- Increase nutritional density with grain selection

Higher fiber grains

- Try new grains and multigrain blends

Ancient grains: Amaranth, Quinoa, Millet, Sorghum, Teff



Add selected amounts of whole grains to popular grain foods

- Gradually incorporate whole grains into foods
 - Make partial whole grain foods-containing whole grains and refined grains
 - Allow consumers time to get used to changes
- Begin with popular items such as pizza crust, tortillas, pasta, buns
- Make stepwise increases over time
- Use clear labeling to communicate benefits

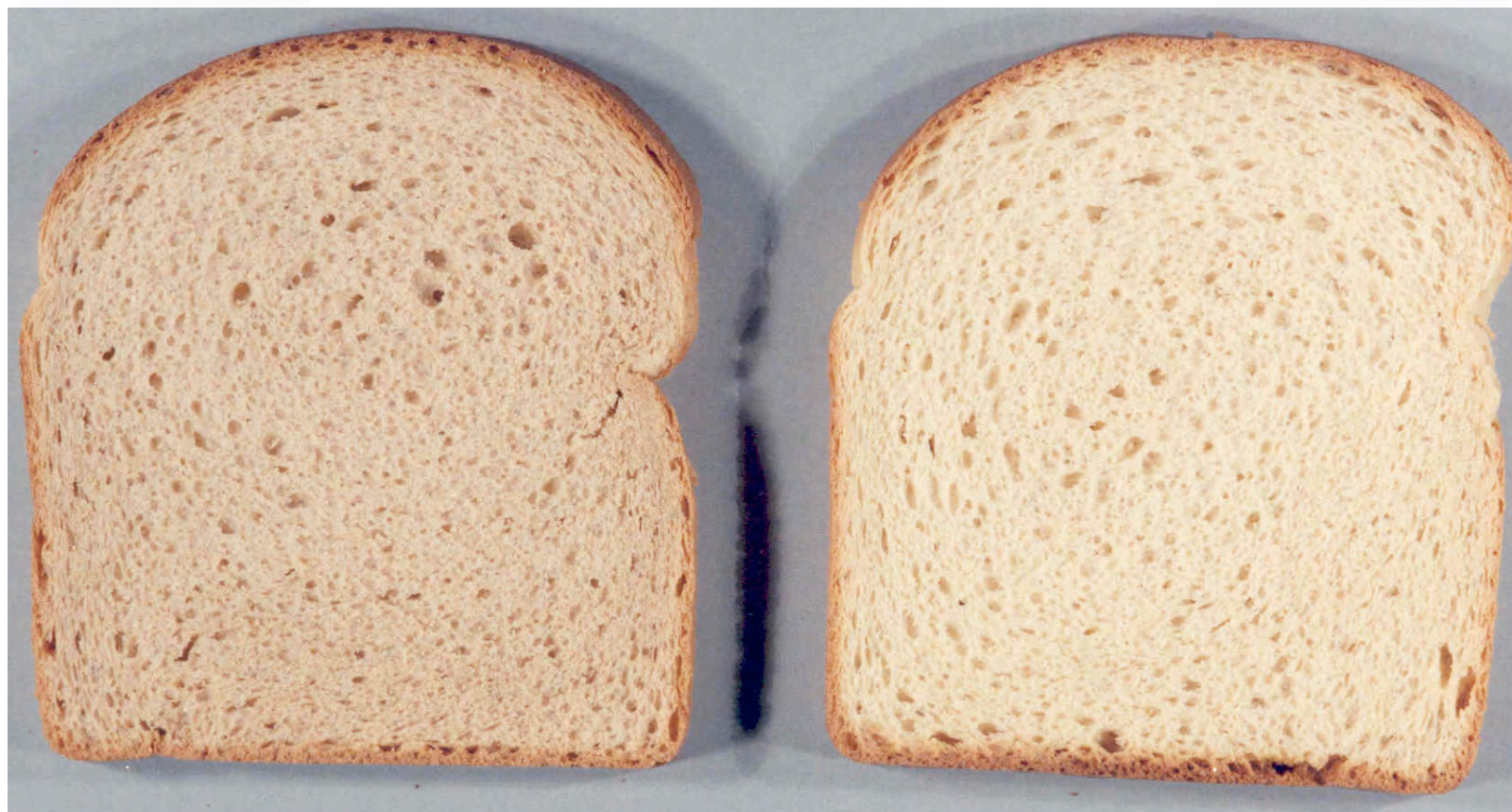


Ultragrain® Whole Wheat Flour

- Specially selected white wheat
 - Lighter color, milder flavor, excellent functionality
 - Available in Hard and Soft
- Whole grain flour with fine particle size
 - Particle size similar to refined flour using a special milling process
 - Smooth appearance and texture
 - 100% whole grain
 - Patents 7,419,694 and 7,425,344



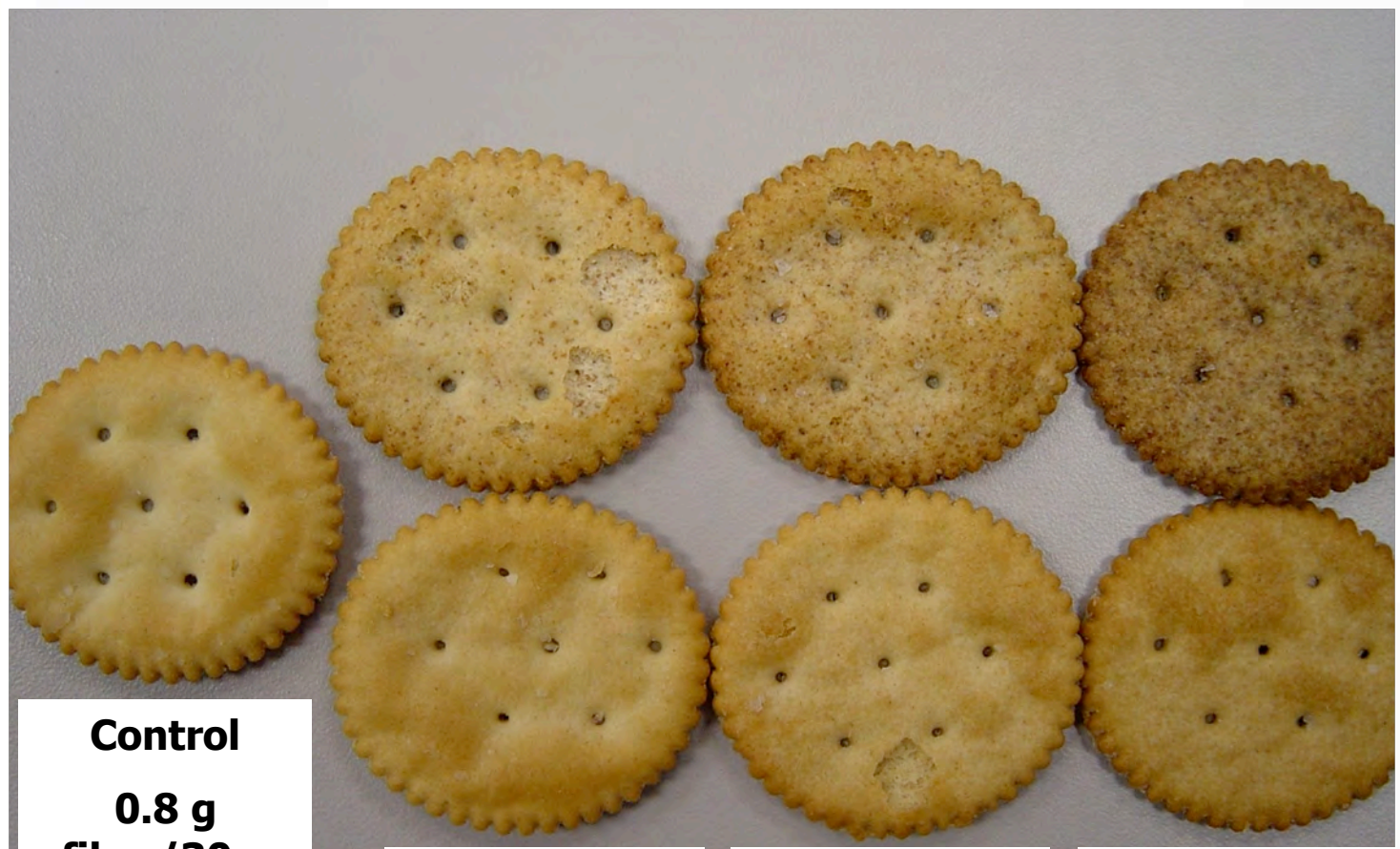
100% Whole Wheat Breads



Fine Red Whole Wheat

Ultragrain® White Whole Wheat

Effect of Wheat Color and Whole Grain Inclusion Level



Control
0.8 g
fiber/30 g

25%
1.3 g fiber

50%
1.7 g fiber

100%
2.7 g fiber

**Fine
Red
Whole
Wheat**

**Ultragrain®
White
Whole
Wheat**

Pizza Crust with Whole Wheat Flour

Bakers % Ultragrain	Formula % Ultragrain	Dietary Fiber/55 g RACC*	Claims Examples
0	0	0.9 g	-----
25	15	1.8 g	9 g whole grain per serving
51	30	2.6 g	17 g whole grain per serving FDA Good Source of Fiber FDA Fiber from Grains, Fruits, Veg/Cancer (101.76)
100	57	4.2 g	33 g whole grain per serving 100% Whole Grain Crust FDA Good Source of Fiber FDA Fiber from Grains, Fruits, Veg/Cancer (101.76) FDA Whole Grains/Cancer & Heart (99P-2209)

Benefits of Ultragrain® White Whole Wheat

- 100% Whole Grain
- Flavor, color & texture more similar to refined flour
- Available in Hard and Soft versions
- Beneficial across inclusion range – stealth to 100% whole grain

Increase nutritional density with higher fiber grains

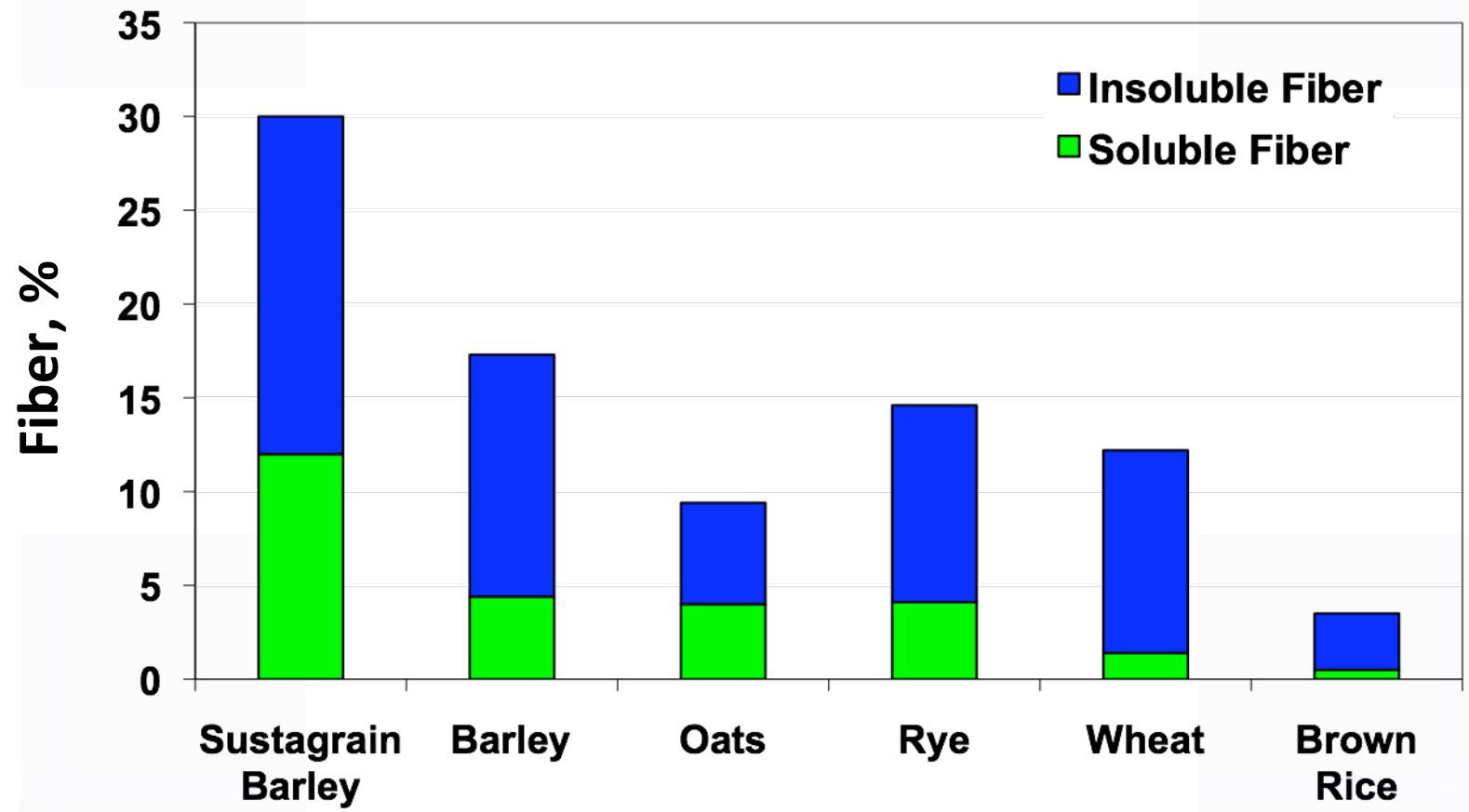
- Barley and Rye
 - Highest fiber content of common cereal grains
 - Soluble fiber (~4%)
 - Beta-glucan in barley
 - Arabinoxylans in rye
 - Fructans
- Opportunities with fiber-enhanced grain varieties
 - ***Waxy, hulless barley (e.g., Sustagrain 30% fiber)***
 - HiMaize whole corn flour

Sustagrain® Barley - unique composition, enhanced benefits

- Waxy, hullless, shrunken endosperm
- Identity-preserved (IP)
- High in fiber (30%) and half the starch (30%) compared to other grains
- 3x more beta-glucan than oats & barley
- 100% Whole Grain



Whole Grains: Fiber Comparison



Sustagrain® - Extended Health & Wellness Benefits

- **Heart Health** - beta-glucan from barley & oats, 21 CFR 101.81
- **Blood Sugar Management** - Shown to lower glycemic response in products including hot cereal, bars, baked goods, beverages
 - Foster-Powell, et al, AJCN, 76:5, 2002
 - Behall, et al, J. Am. Coll. Nutr., 24:182, 2005
- **Hunger/Weight**
 - Liljeberg, et al., AJCN, 69:647, 1999 - Breakfast including Sustagrain delayed between-meal fasting, increased satiety, improved glucose tolerance at lunch.
 - Schroeder, et al., Appetite, 2009 - Subjects significantly less hungry with Sustagrain compared to whole wheat and refined rice
 - Lifschitz, et al, J. Nutr., 132:2593, 2002 – Sustagrain lower absorption
- **Digestive Health** – higher fiber



Sustagrain® Product Development Opportunities

- Broad Range of Applications
 - Including breads, pilaf, pasta, bars, tortillas, coatings, meat, quick breads, cookies, crackers, extruded cereals and snacks
- Enables claims in a range of products
 - Foods with small serving size
 - Foods with low % grain ingredients
 - Multigrain blends
- Can also provide functional benefits
 - Moistness (muffins)
 - Reduced staling (breads)
 - Flexibility (tortillas)



Whole Grain Fiber Comparison for Claims

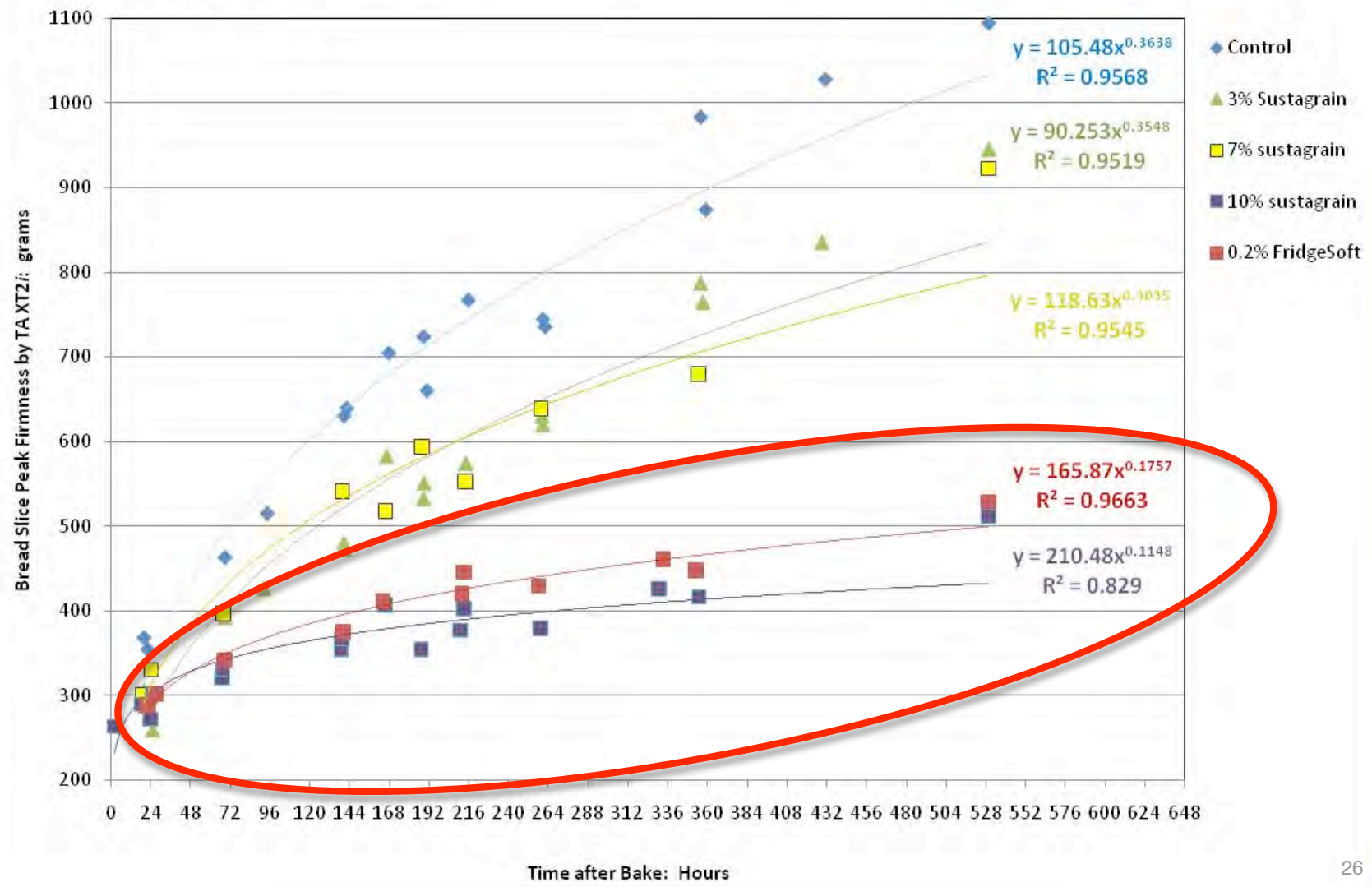
Whole Grain	FDA Heart Health (1)	FDA Heart Health (2)	Good Source Fiber	Excellent Source Fiber
	Grams Whole Grain Needed for Claim (minimum)			
Oats*	15	18.8	26.6	53.2
Wheat*	43	NA	21	41
Barley, Sustagrain®	5	6.3	8.4	16.7

- 1) 0.6 g soluble fiber from fruit, veg or grains (CFR 101.77)
- 2) 0.75 g beta-glucan soluble fiber from oats or barley (CFR 101.81)

*Oats USDA 09402

*Wheat USDA 20080 and J Agric Food Chem, 2001, 49:2437

Sustagrain® Barley Impact on Crumb Softness in 51% Whole Grain Pan Bread



Enhanced Nutrient Whole Grains - Why Use?

Sustagrain Barley Example

- Whole Grain
- Rich in Fiber
- Higher soluble:insoluble compared to most grains, fruits & vegetables
- Qualifies for FDA approved food specific heart health claim
- Enhanced health and wellness benefits
- Clean label
- Functional benefits (moisture retention for shelf life)

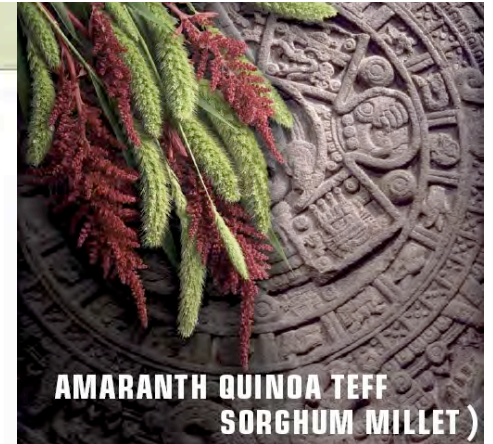
Try New Grains and Multigrain Blends

- Ancient grains
 - **Amaranth** – higher protein value, minerals & folic acid
 - **Quinoa** – Incas, higher protein value, potassium, folic acid
 - **Sorghum** – 5th highest in world, versatile, more cost effective
 - **Millet** – versatile, mild flavor
 - **Teff** – staple in Ethiopia, very tiny seed, higher minerals
- Ancient Grains also include spelt, Kamut®, farro, einkorn, emmer
- What is different/better about ancient grains?
 - Unique flavors
 - Visual interest – seed size, shape and color
 - Primarily used as whole grains ingredients



Ancient Grains

- Consumer interest is increasing
 - Increased use in fine dining
 - Now found beyond natural foods section of supermarkets
 - Appealing to adventuresome consumers
 - Health & wellness benefits of interest



Ancient Grains = Whole Grain + Cuisine Adventure

- Still small at retail and less known to consumers
- Whole grain nutrition



Made with 51% whole 9-grain blend including amaranth, quinoa, millet, sorghum, teff



Made with Amaranth

Ancient Grains

Whole Grain Flour	Absorption	Flavor
Amaranth	Strong hydration	Fresh corn husk/silk notes
Millet	Low hydration	Low impact flavor, baking can impart bitter notes
Quinoa	Moderate hydration	Corn and legume notes
Sorghum	Low hydration	Slightly sweet, light corn notes
Teff	Moderate hydration	Low impact, hint of molasses

Product Development with Ancient Grains

- 15% (flour basis) can be used in a broad range of applications
- Breads 25%
- Quick breads/muffins 50%
- Cookies 50%
- Crackers 25%
- Extruded Cereals/Snacks 50%
- Pasta 25%

Ancient Grains add Variety: amaranth, quinoa, millet, sorghum and teff

- Unique flavors
- Visual interest and texture
- Naturally gluten free
- Whole grain nutrition
- Product applications include bakery, pasta, extruded snacks, batters & breadings



Communicating Whole Grain Benefits to Consumers



Labeling to Identify Whole Grain Foods

- Product Name
 - e.g., “100% Whole 7-Grain Bread”, “Bun Made with Whole Grain”
- Amount of Whole Grain
 - Grams or % Whole Grain
- Symbols – Whole Grains Council Stamp
- FDA Approved Whole Grain Health Claim
 - At least 51% whole grain by product weight & meets other criteria
- Ingredient Legend
 - Designate as whole or whole grain – e.g., whole grain oats, whole grain brown rice



What is a Whole Grain Food?

- Not universally defined today
- Definition needed for package labeling, consumer communication, research data assessment
- AACCC Whole Grain Working Group is working to provide recommendations
- Several definitions under consideration, including
 - at least 51% of grain ingredients as whole grain
 - at least 8 g per ounce-equivalent

Wrap Up - Formulating Whole Grain Foods for Success

- Add selected increments of whole grains to popular grain-based foods (e.g., pizza, tortillas, pasta, snacks)
- Improve acceptability of whole-grain foods via
 - % grain inclusion
 - Grain selection (e.g., white wheat vs. red)
 - Grain ingredient processing methods (e.g., flour particle size)
- Increase offerings of new/unique whole grain foods
 - Use new or less familiar grains (e.g., ancient grains, purple barley, rye)
 - Use creative product formulations
- Utilize consistent, clear labeling and claims

