Gradually Introducing Consumers to the Health Benefits of Whole Grains

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Biography of Len Marquart

Len Marquart, PhD, RD is an Associate Professor in the Department of Food Science and Nutrition at the University of Minnesota. His current research focuses on consumer understanding and factors that influence whole grain consumption. While at General Mills, he led the company's research in the health aspects of whole grains. He received the James Ford Bell Technical Leadership Award and the General Mills Presidents' (Champion) Award for his contributions. Len is the founder and president of the Grains for Health Foundation. The Foundations current focus is to facilitate communication and to integrate science and technology into the grains supply chain to help deliver more grain foods that meet dietary guidance.

Past, Present & Future of Whole Grains

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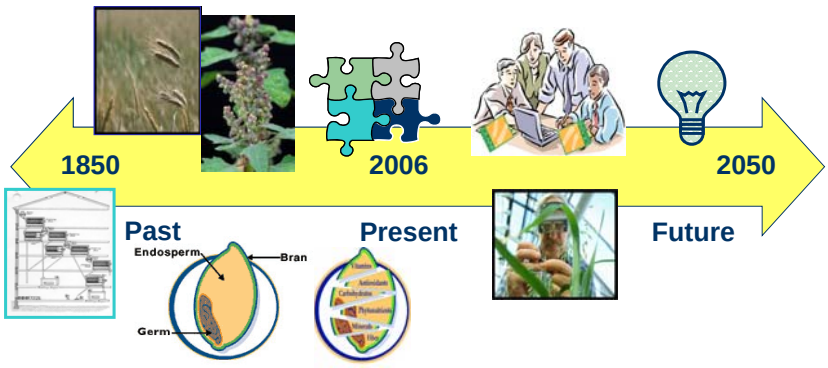
Objectives

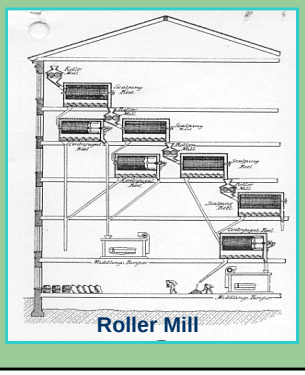
- Explore anticipated changes in whole grain product availability
- Review a gradual approach to whole grains usage
- Rally for a collaborative research model

Whole Grains Timeline



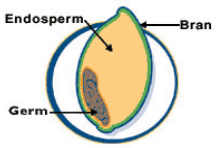
Past…

…Roller Mill Revolutionizes Grain Industry


Roller Mill

Past

- The more things change, the more they stay the same
- Grain and whole grain product availability in the past

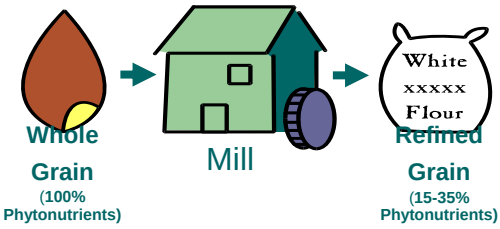


Timeline: Classic Grain Product Intros

1876	Premium Saltines
1880	Gold Medal Flour
1881	Pillsbury Flour
1889	Aunt Jemima Pancake Mix
1891	Quaker Oats
1895	Triscuits
1897	Grape-Nuts Cereal
1898	Nabisco Graham Crackers
1898	Nabisco Shredded Wheat Cereal
1900	Barnum's Animal Crackers
1906	Kellogg's Corn Flakes
1912	Oreos

Past Research

- Prior to mid-1800s, whole grains were the foodstuff “norm”
- Introduction of the roller mill (1850)
  - Changed manufacture of grain foods
  - Refined grain products were developed
  - Explosion of new refined grain foods



Past Research

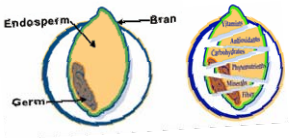
- During WWII, B-vitamin deficiencies were a problem
  - Lead to enrichment policies and programs for grain foods
- In 1960-70s, research by Burkitt, Trowell and others began to show health benefits of fiber

Present…

…Whole Foods Become Driving Force

Present

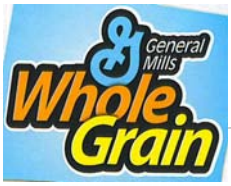
- Review a gradual approach to whole grains usage
- Explore anticipated changes in whole grain product availability
- Rally for a collaborative research model



Timeline: Current Whole Grain Products

1985

1991



1997 Quaker Oatmeal campaign

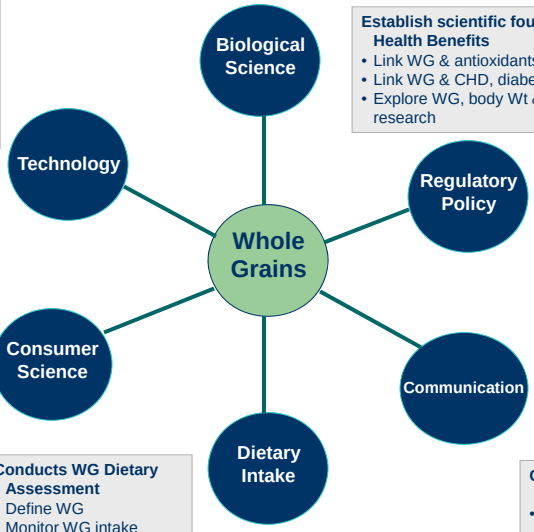
2004 ConAgra Whole White Wheat Flour

2005 Triscuit WG effort / General Mills Cereals

Whole Grains and Health Issues

Develop taste, convenience, efficacious WG foods
- Explore appropriate WG foods
- Incorporate WG into new / existing foods

Create compelling WG messages
- Encourage industry/academic collaboration
- Create compelling educational, PR & Adv message



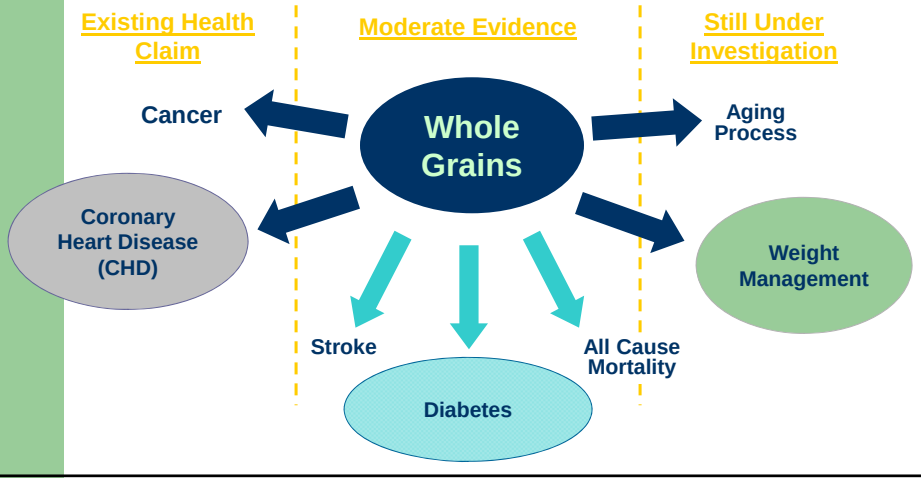
Establish scientific foundation for Health Benefits
- Link WG & antioxidants
- Link WG & CHD, diabetes
- Explore WG, body Wt & molecular research

Establish foundation for WG Regulation & Policy
- Include "Universal" WG symbol at base of Pyramid
- Place WG symbol / logo on package

Conducts WG Dietary Assessment
- Define WG
- Monitor WG intake
- Examine WG intake & health/chronic disease

Create WG awareness & behavior change
- Enhance WG education, PR & Adv campaign
- Establish WG consortium

Whole Grain Benefits



Whole Grain Definitions

- American Association of Cereal Chemists (AACC)
  - Ingredient

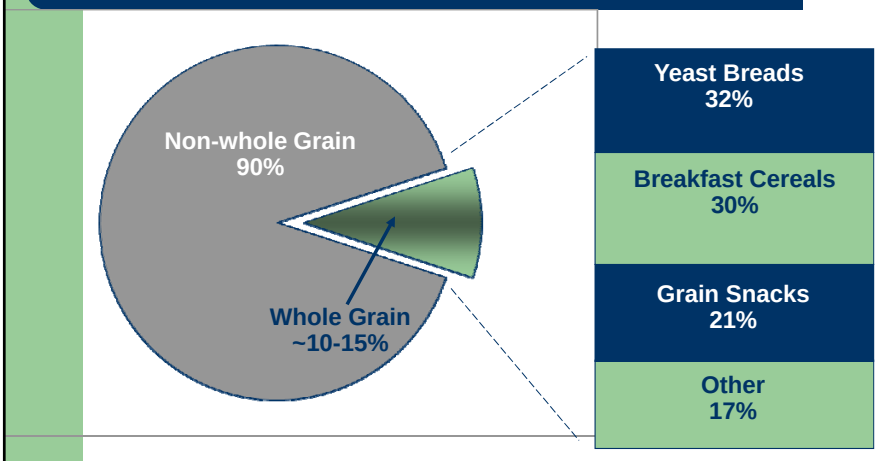
    "Whole grains shall consist of the intact, ground, cracked or flaked caryopsis, whose principal anatomical components – the starchy endosperm, germ and bran – are present in the same relative proportions as they exist in the intact caryopsis"

- Whole Grain Health Claim
  - Food
    - **51% whole grain by weight of finished product**

Whole Grain Definition

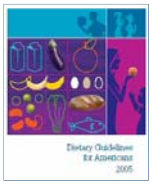
- **USDA Definition**
  - Grain foods other than cereal
    - 1 serving whole grain bread
      - 16 g whole grain flour
    - 16 g whole grain per 30 g RACC serving
      - About 51% whole grain

Whole Grain Consumption



Dietary Intake of Whole Grains

- Less than 1 serving per day
- Based on consumption data
  - CSFII 1994-96 for US adults



Source: Cleveland et al, 2000, JACN 19:331S

Consumer Issues

- What is a whole grain?
- How do you identify a whole grain?
- Why are whole grain foods good for you?
- How do you incorporate whole grain into your diet?
- Why aren't whole grain foods readily available?

Future…

…Who Will Be The New Whole Grain Market Leader?

Future - Beyond Whole Grain Foods

- Incidence of chronic disease, health care costs are driving forces
- The first company out of the gate with good tasting more efficacious products will win market share…
- Rally for a collaborative research model

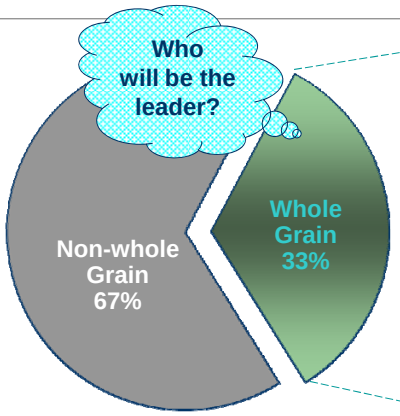
Timeline: Future Whole Grain Products

2007 — **Whole Grain Plus Breads**

2025 — **Whole Foodies**

2050 — **PhytoActive Cereal**

Future Whole Grain Consumption



- **Yeast Breads 32%**
- **Breakfast Cereals 30%**
- **Grain Snacks 21%**
- **Other 17%**

Suggested Approach

- Gradually introduce partial whole grains into the US food supply
  - Similar to the gradual transition from whole milk to skim milk
  - Develop partial whole grain products with lower levels of whole grain flour
  - Pizza, bread, rolls, bagels, crackers

Partial Whole Grain Foods

- Hypothesis
  - Gradual incorporation of partial whole grain foods
  - Significantly increase whole grain consumption
  - Consumer friendly manner

Gradual Inclusion of Whole Grain Flour (WGF)

Food	% WGF in Existing Formula	Feasible % WGF in Formula
Dark bread	50	0
Muffin	0	50
White bread	0	25
Refined cereal	0	50
Whole grain cereal	75	0
Brownie	0	100
Cookie, ready made	0	50
Pie, ready made	0	25
Pizza	0	30
Pancake/waffle	0	50
Pasta	0	25
Cracker	0	50
Biscuit	0	15

Marquart, L et al. CFW, 51 (3) 2006, 118-121.

Plate Waste Studies

- Developed a method to introduce whole grains in various foods to test acceptance among school age children.
- Determine acceptability based on plate waste—what is eaten vs. what is tossed in the garbage
  - Pizza
  - Pasta
  - Rolls
  - Breadsticks
  - French bread

White Whole Wheat in Schools

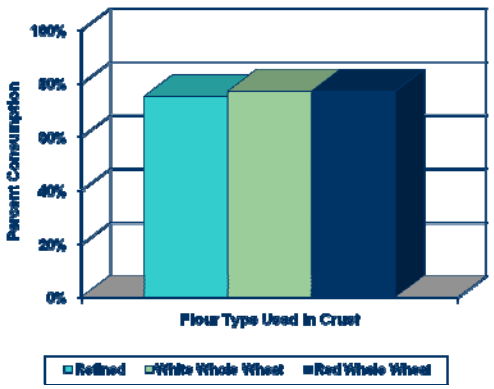
- Percent consumption of grain foods made with different levels of white whole wheat in grade schools.
- Gradual introduction of whole grains made buns and rolls acceptable.

Whole Grain %	Hamburger Buns	Dinner Rolls	Total Grains
0	65	78	74
11	65	78	66
23	63	69	68
32	55	74	66
45	67	68	68
68	62	51*	57*
90	62	70	59*

*$p < 0.05$ significance

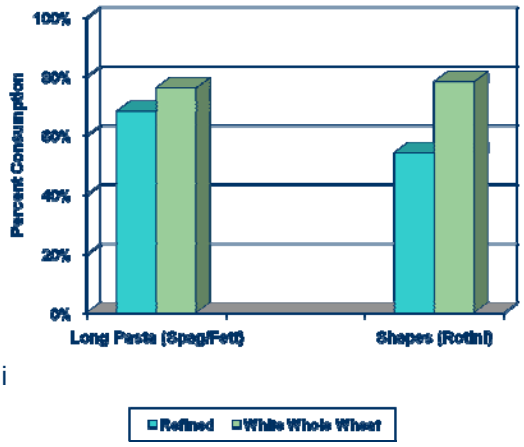
Pizza Data

- Percent Consumption was determined from plate waste in grade schools.
- Pizza crust made with white or red whole wheat was just as acceptable as traditional crust from refined flour.



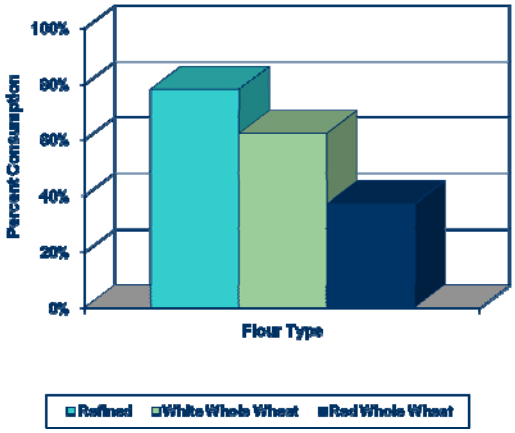
Pasta Data

- Percent Consumption was determined from plate waste.
- Spaghetti/Fettuccini made with white whole wheat was more acceptable than pasta made with traditional refined flour.
- White whole wheat improved likability of rotini pasta.



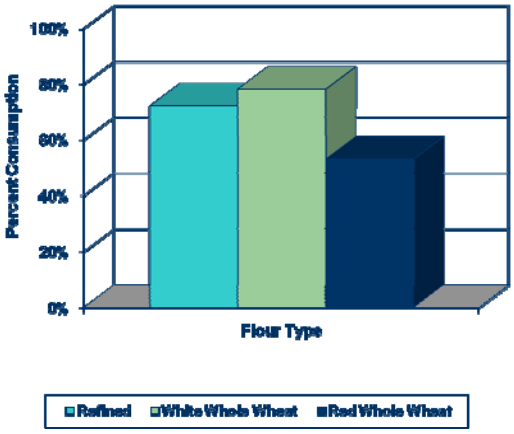
Dinner Roll Data

- Percent Consumption was determined from plate waste.
- Rolls made with white whole wheat were as acceptable as rolls made with refined flour.
- Red whole wheat was less acceptable as shown by more waste.



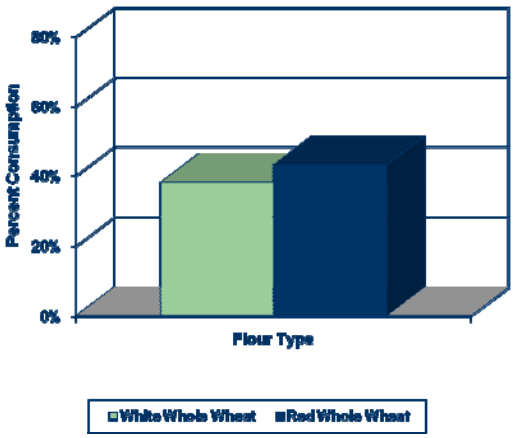
Breadstick Data

- White whole wheat breadsticks were more acceptable than those made with refined flour.
- Again, red whole wheat was least accepted by kids as shown by less eaten hence, waste.



French Bread Data

- Whole grain delivery food must be selected carefully.
- French bread made with even white whole wheat was not well accepted by school children.



After School Snacking Program : Crackers I

- **Purpose**
  To examine differences in consumption of WG and refined grain crackers available in the marketplace.

- **Subjects**
  150 (K-6) students (after-school snack programs), Roseville elementary school, St Paul, MN
  > ~ 68% White children

- **Products**

Cheddar Cheese RG Goldfish	0g/svg
Cheddar Cheese WG Goldfish	8g/svg
Honey Maid Grahams WG	5g/svg
100% WW Honey Grahams	26g/svg

Consumption (%) for Snack Products

Snack Product (g WG)	Consumption (%)	WG consumed (g)
Goldfish 0g	78 ± 4.3[a]	0
Graham crax 5g	80.2 ± 5.1[a]	4.01
Goldfish 8g	75.4 ± 5.2[a]	6.03
Graham crax 26g	52.0 ± 11.4[b]	13.52

After School Snacking Program : Crackers II

- **Purpose**

  To determine an acceptable WG flour content in Graham crackers served to children in after-school snack programs

  — 5g, 8g, 12g, or 16g/svg?

  — Use of plate waste, taste tests, group interviews

- **Hypothesis**

  There will be no difference in children's consumption for Graham crackers with 5, 8, 12 and 16g WG / svg

Methods

- **Schools / Subjects**
  - 100 children (grades K-6) from 4 after-school snack programs in the Roseville School District
  - White children accounted for ~ 68% of the total population, and ~1/3 were minorities

- **Products**
  - Graham crackers with 5g, 8g, 12g, 16g WG flour/svg (30g) developed by Kraft Global Foods, Inc.

Graham Snacks

Graham 5g Graham 8g Graham 12g Graham 16g

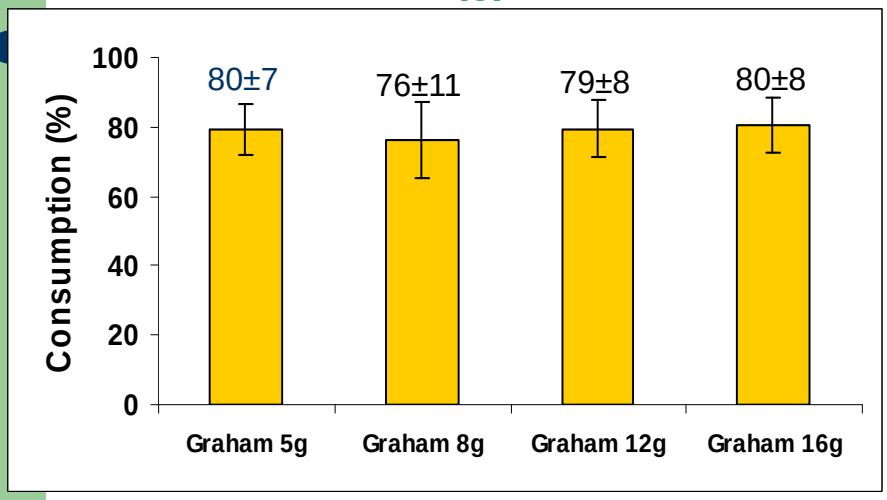
Crackers provided by Kraft Foods Global, Inc.

Graham Cracker Specifications

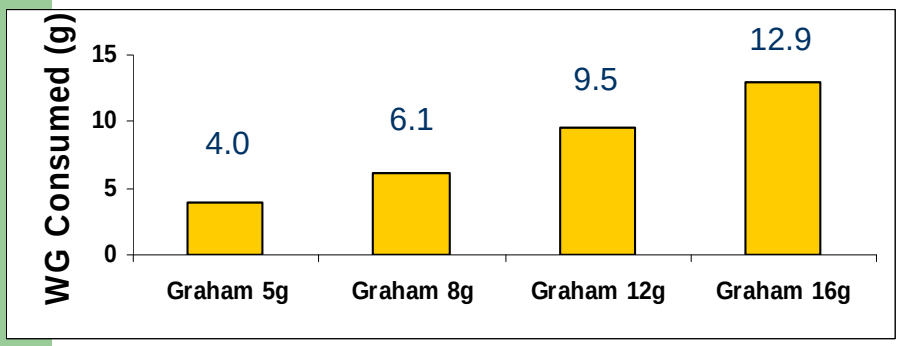
Nutrient content per serving	Traditional Graham	Graham 5g	Graham 8g	Graham 12g	Graham 16g
Serving Size (g)	30	30	30	30	30
Energy (kcal)	130	133	131	130	128
Total fat (g)	3	4	4	4	4
Total carbohydrate (g)	24	22	22	22	22
Total protein (g)	2	2	2	2	2
Dietary Fiber (g)	1	1	1	2	2
Sugars (g)	7	7	7	7	6

Nutrient Specification for Tested Graham crackers provided by Kraft Foods Global, Inc.

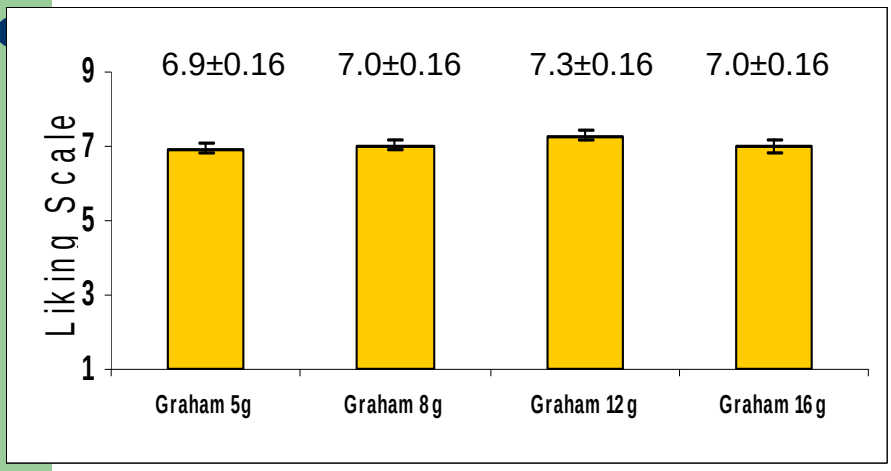
Whole Grain Consumption per Graham Snack (g)



Whole Grain Consumption per Graham Snack (g)



Taste Test Results for Graham Snack Liking



Summary

- Manufacturers may use these data for developing and marketing acceptable Graham crackers for after school snack programs
- WG products developed specifically for after school snack programs may help to increase WG consumption among elementary school children

Conclusions From Studies

- Choose appropriate food for delivery of whole grains
  - Pizza vs. French bread
- Introduce whole grains gradually for best acceptance
- Serve rather than offer whole grain foods to kids
- Choose center-of-plate foods (such as pizza) instead of optional (rolls, breadsticks)
- Assure shelf-life and quality of whole grains to reduce off-flavors and rancidity
  - Purchase, storage and preparation

Whole Grains Research

- Collaborative Grains Research
  - Leverage research $$ to enhance innovation for top-line growth
  - Leverage supply chain research
- Short-term and Long-term Research
  - Provide pipeline of research to drive short-term PR and Marketing efforts
  - Drive and sustain long-term innovation
- Proprietary Grains and Health

Collaborative Grains Research

- Background
  - CEOs want sustained and steady top-line growth
  - Innovation costs are climbing faster than growth
  - Increased need for innovation yet shrinking R&D $$
  - Manufacturers are facing growth mandates that current innovation models cannot support

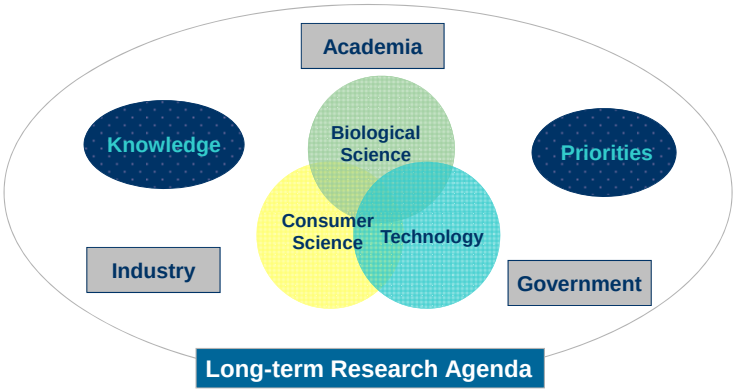
Whole Grain Questions Remain

- Biological Sciences
  - Mechanisms
- Consumer Sciences
  - Consumer identification of whole grains
- Technology
  - Processing of bioactive components and efficacy

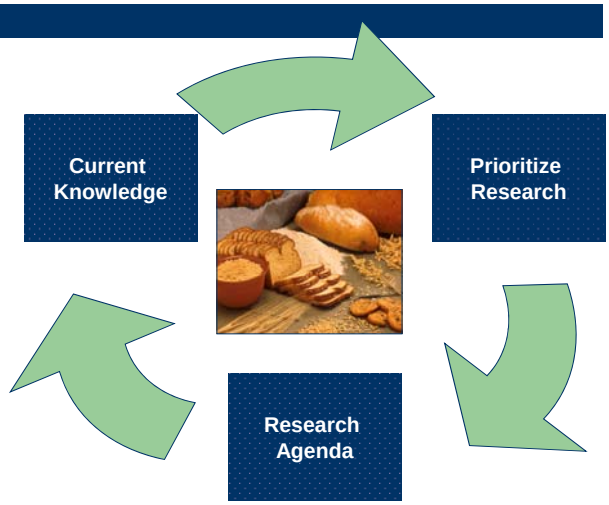
Grains & Health Consortium

- Purpose
  - To increase the consumption of grain products to enhance health of the population.
- Mission
  - To improve health of the population through basic, applied and translational research of grains/components.
- Approach
  - Create Collaborative to support research to enhance knowledge and use of healthful components of grains in foods.
  - Research funded through grants/contracts carried out collaboratively to maximize research efforts, speed of discovery and acceptance of results.

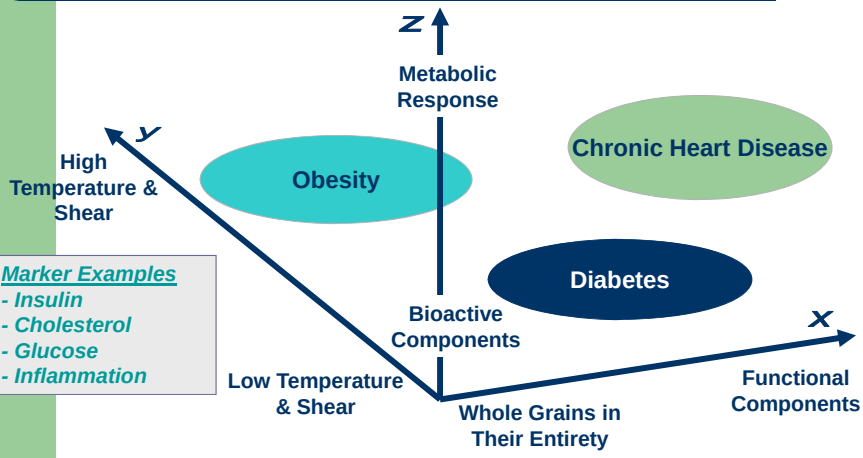
Collaborative Research Model



Continuous Whole Grain Cycle



Nutrition and Health Research



Implications

Meet the mission of all sectors:

- Industry
  Conduit to link the basic sciences to the consumer
- Government
  Enhance consumer compliance to dietary guidance
- Academia
  Increase grain knowledge and application through discovery, scholarship and outreach

Riding the Whole Grain Train

Collaboration

- Government
- Academia
- Industry
- Trade groups
- Health advocates
- Activist groups
- Media