The Whole (Grain) Truth and Nothing But the Truth
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ConAgra Foods Science Institute

With a mission of:

Promoting Dietary and related Choices affecting Wellness by linking evidence-based Understanding with Practice
Today’s Faculty

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- Elizabeth Arndt, PhD – Director, Research, Quality and Innovation, ConAgra Foods

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Learning Objectives

- Describe whole grains

- State daily grain and whole grain recommendations for children

- Explain health benefits of wholegrain foods

- Identify whole grain foods using product package labeling and descriptions

- Consider ways to include whole grain foods into menus
The Whole (Grain) Truth and Nothing But the Truth

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• State daily grain and whole grain recommendations for children
• Explain health benefits of eating whole grain foods
• Identify whole grain foods using product package labeling and descriptions
• Consider ways to include whole grain foods into diets and menus
Section 1. Whole Grains

• Types of grains
• Grain components
• Definition
• Whole grain and refined grain examples
There are Many Types of Grains

• 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

• Legumes, Oilseeds and Nuts are not Grains (e.g., flax, chia, sunflower, soybeans)
Whole Wheat Kernel

- Bran (15%): Fiber, B vitamins, Minerals, Phytonutrients
- Endosperm (82%): Carbohydrates, Protein
- Germ (2 - 3%): Unsaturated Fats, Vitamin E, B vitamins, Phytonutrients

[Diagram of a whole wheat kernel with annotations for each part and their nutrient content.]
What is a Whole Grain?

• Whole grains contain all the parts (and naturally occurring nutrients) of the entire grain seed kernel.

• Grains have three parts:
  – Endosperm
  – Bran
  – Germ

• If the grain is processed (e.g., cracked, rolled, extruded, and/or cooked), it should contain the same amounts of endosperm, bran and germ before and after processing.

Source: www.wholegrainscouncil.org
Whole Grain Ingredients and Foods

• Look for and use “Whole” or “Whole Grain”
  – Rolled Oats → Whole Rolled Oats
  – Brown Rice → Whole Brown Rice

• Clarify terms
  – Multigrain – considered more appealing and nutritious than “Whole Grain” or “Whole Wheat”, however, multigrain doesn’t guarantee whole grain

• Group whole grain ingredients when appropriate
  – e.g., Kashi seven whole grains & sesame blend (hard red wheat, brown rice, barley, triticale, oats, rye, buckwheat, sesame seeds)
  – e.g., Healthy Choice All Naturals 51% Whole 9-Grain Pasta
    Whole grain flours (wheat (Ultragrain®), barley (Sustagrain®), rye, oats, amaranth, quinoa, millet, sorghum, teff)
Is it Whole Grain?

- **Corn Masa** – traditionally used for making corn chips and corn tortillas
  - Some loss of bran
  - Increased bioavailability of B-vitamins
  - Generally considered whole grain

- **Bulgur (precooked wheat)** – used in side dishes
  - Generally considered whole grain

- **Sprouted/Malted Grains** – used in breads
  - Can be whole grain if sprout growth is controlled
  - Look for Whole Grain labeling

- **Pearled Barley** – used in side dishes, soups, hot cereal
  - Pearled barley is not whole grain
  - Look for Whole Grain labeling

- **Wheat Bran & Germ, Rice Bran** – used in breads & other baked products, cereals, supplements
  - Bran and germ are nutrient dense, but not included with Whole Grains for labeling
Refined Grains

• Wheat flour – In milling, most of bran & germ is removed along with most of the fiber, vitamins, minerals & other phytonutrients

• Enriched wheat flour – some nutrients are added back per FDA standards
  – B-vitamins (thiamin, riboflavin, niacin, folic acid)
  – Iron
  – Calcium optional

• Other refined ingredients/foods with FDA enrichment standards
  – Enriched breads, rolls, buns
  – Enriched macaroni and noodle products
  – Enriched corn meals
  – Enriched rice
  – Enriched farina

• Enrichment does not replace all of the nutrients that are lost with the removal of the bran and germ
Section 2. Recommended Grain Intake

• Recommended grains intake
• Current grains intake
Encouraging Grain Consumption

- Based on the 2005 Dietary Guidelines for Americans and MyPyramid recommendations:
  - At least **HALF** of daily grain intake should be whole grain.

- Total recommended grain intake depends on:
  - Age
  - Gender
  - Physical activity
Whole Grain Intake Recommendations

www.myPyramid.gov

• Ounce equivalent – new term describing a serving size of grains

• Consume 3 or more ounce-equivalents of whole grain foods daily (2,000 calorie diet)

• Examples of ounce-equivalents of grain foods:
  – 1 slice of bread
  – 1 cup ready-to-eat cereal
  – ½ cup cooked rice, cooked pasta, or cooked cereal
# Grain Foods Recommended Daily Amounts

<table>
<thead>
<tr>
<th>Gender and Age</th>
<th>Total Grains (ounce equivalents)</th>
<th>Whole Grains (ounce equivalents)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Children</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2-3 years</td>
<td>3</td>
<td>1.5</td>
</tr>
<tr>
<td>4-8</td>
<td>4-5</td>
<td>2-2.5</td>
</tr>
<tr>
<td><strong>Girls</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-13</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>14-18</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td><strong>Boys</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9-13</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>14-18</td>
<td>7</td>
<td>3.5</td>
</tr>
<tr>
<td><strong>Women</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19-30</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>31-50</td>
<td>6</td>
<td>3</td>
</tr>
<tr>
<td>51+</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td><strong>Men</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>19-30</td>
<td>8</td>
<td>4</td>
</tr>
<tr>
<td>31-50</td>
<td>7</td>
<td>3.5</td>
</tr>
<tr>
<td>51+</td>
<td>6</td>
<td>3</td>
</tr>
</tbody>
</table>
Not Enough Whole Grains

• We are not eating enough whole grains.
  – Only 1 of 10 adults and children in the US are eating the recommended amount of whole grains each day

• For a 2,000 calorie diet:
  – 6 ounce-equivalents of grain foods/day
  – At least 3 ounce-equivalents of whole grain foods/day
  – MAKE HALF YOUR GRAINS WHOLE

Section 3. Health Benefits Associated with Whole Grain Intake

• Nutrients and phytonutrients
• Health benefits
Whole Grains Have Key Nutrients

- **Dietary fiber** helps to lower cholesterol and reduce heart disease risk, assists with digestion and fullness with fewer calories.

- **B vitamins** (thiamin, riboflavin, niacin and folate) aids metabolism, releasing energy from macronutrients, nervous system, red blood cells.

- **Iron** carries oxygen in the blood.
- **Magnesium** helps build bones, helps release energy from muscles.
- **Selenium** protects cells from oxidation, healthy immune system.
- **Manganese** helps bone and connective tissue development.
- **Chromium** assists in glucose and insulin regulation.
Whole Grains have Phytonutrients

• Whole grains naturally contain phytonutrients

• Phytonutrients are “plant substances” with beneficial effects on health. They include:
  – Flavonoids, phenolics and phytoestrogens - act as antioxidants
  – Saponins, oligosaccharides, sphingolipids and stanols – may help reduce cholesterol
  – Lectins and protease inhibitors – may help with immune function
  – Amylase inhibitors and fiber (resistant starch) – may help manage blood glucose
  – Phytate, lignans – may help reduce cancer risk
  – Fiber – may assist with weight maintenance and digestive health
Whole Grain Benefits = Synergy

Synergy Means Components Working Together

- Fiber
- Lectins
- Phytate
- Lignans
- Protease Inhibitors
- Resistant Starch
- Amylase Inhibitors
- Saponins
- Stanols
- Sphingolipids
- Oligosaccharides
- Flavonoids
- Phytoestrogens
- Phenolics
- Phytate
- Lignans
- Whole Grain
Whole Grain Health Benefits

• Whole grains help reduce risk for heart disease and some cancers in adults
  – $\downarrow$ Risk of heart disease by 25-36%
  – $\downarrow$ Risk of digestive system cancers by 21-43%
  – $\downarrow$ Risk of hormone-related cancers by 10-40%

Sources: Steffen et al. 2003; Jacobs et al. 1999; Liu et al. 1999; Jacobs et al. 1998; Kasum et al. 2002; Chatenoud et al. 1998
Whole Grain Health Benefits

• Whole grains help reduce risk for stroke and diabetes
  – ↓ Risk of stroke by 36%
  – ↓ Risk of type 2 diabetes by 21-35%

• Whole grain intake is associated with weight maintenance
  – ↓ Risk of being overweight in adults and adolescents

Sources: Liu et al., 2003; Steffen et al., 2003; Good et al. 2004; Meyer et al. 2000; Liu et al., 2000; Montonen et al., 2003
Section 4. Identifying Whole Grain Foods

- Product Name
- Symbols – Whole Grains Council Stamp
- Amount of Whole Grain
  - Grams of Whole Grain or Percent Whole Grain
- FDA Approved Whole Grain Health Claim
  - “Diets rich in whole grain foods and other plant foods, and low in total fat, saturated fat and cholesterol may reduce the risks of heart disease and certain cancers.”
  - At least 51% of product weight is whole grain & meets other criteria
- Ingredient Legend
Ways to Identify: *Product Name*

- Look for Whole Grain Product Name Claims.

**Examples of Whole Grain Product Names**
- **Whole Grain** Spaghetti
- Soup **Made with Whole Grain** Pasta
- **100% Whole Wheat** Boboli Pizza Crust
Ways to Identify: *Symbols*

- Look for the Whole Grains Council Stamp. (www.wholegrainscouncil.org)
Ways to Identify: *Amount*

- Look for the Amount of Whole Grain (Grams or Percent)

Made with 50% Whole Grain
Ways to Identify: *Health Claim*

- Look for the FDA Approved Whole Grain Health Claim - product must contain 51% or more whole grain by product weight and meet other criteria for fat, sat fat and cholesterol.

```
Ingredients: Whole Corn, Sunflower Oil, Whole Wheat, Rice Flour, Whole Oat Flour, Sugar, Salt
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“Diets rich in whole grain foods and other plant foods, and low in saturated fat and cholesterol, may help reduce the risk of heart disease.”
Ways to Identify: *Ingredients*

- Look for Whole Grain Ingredients first or near the top of the ingredient list.

**Whole Grain Spaghetti Ingredients:**
- Whole grain wheat, whole grain brown rice, whole grain oats, wheat gluten, crystallized cane juice, natural flavor [soybean oil, natural flavorings], wheat bran

**Pancake Mix Ingredients:**
- Whole wheat flour, enriched bleached flour (bleached wheat flour, niacin, reduced iron, thiamin mononitrate, riboflavin, folic acid), leavening (sodium bicarbonate, sodium aluminum phosphate, monocalcium phosphate), brown sugar, sugar, dried molasses, salt, wheat germ, hydroxylate soy lecithin, soy flour
Gluten Free Grains

• Grains with gluten are wheat (all types), barley, rye and triticale. Oats may be cross-contaminated based on common growing locations and supply chain.

• Gluten free estimated growth potential to be a $1.6 billion industry in specialty products.

• Bread and baked goods relatively small portion of total GF products.

• There is a need for more whole grains and fiber in GF products - refined rice and starch bases are still common.

• “Super six” gluten free grains are amaranth, quinoa, millet, teff, sorghum, and buckwheat based on nutrient contributions. (source: Harvard Health Letter 06/2009)

• Consumers with celiac disease or gluten intolerance long for a good sandwich. (source: ConAgra Mills consumer focus groups, 06/2009)
Section 5. Whole Grain Foods

• Acceptability challenges
• Solutions
Whole Grains can enhance the nutritional value & resulting benefits in many foods

- Baked goods (including breads, tortillas, biscuits, muffins, quick breads)
- Bars (granola, nutritional, fruit & grain)
- Breakfast cereals (Hot & RTE)
- Snacks – sweet and savory
- Toppings and inclusions
- Desserts
- Breaded/battered products
- Vegetarian patties
- Pasta
- Soups
- Side Dishes
- Meat applications
Increasing consumption of whole grain foods: What are the challenges?

• Whole grain foods can be different from refined grain foods
  – Flavor – may have stronger grain flavor, may have bitter notes
  – Texture – may be more coarse, dense or dry
  – Appearance – may have darker color and bran specks

• Limited whole grain choices in some types of foods and markets

• Difficulty in identifying whole grain foods

• Cost may be higher
Meeting Recommendations with Partial Whole Grain Products

- If bread contains at least 16 grams whole grain per serving (slice) — **3 slices** are needed to meet the recommended whole grain intake.

- If bread contains 8 grams whole grain per serving (slice) — **6 slices** are needed to meet the recommended whole grain intake.
Pizza Dough:
Recipe Changes to Whole Grain

<table>
<thead>
<tr>
<th>Ingredient</th>
<th>0% Whole wheat grams</th>
<th>25% Whole wheat grams</th>
<th>51% Whole wheat grams</th>
<th>100% Whole wheat grams</th>
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</thead>
<tbody>
<tr>
<td>Wheat flour</td>
<td>750</td>
<td>562</td>
<td>368</td>
<td>0</td>
</tr>
<tr>
<td>Whole wheat flour</td>
<td>0</td>
<td>188</td>
<td>382</td>
<td>750</td>
</tr>
<tr>
<td>Water</td>
<td>412</td>
<td>431</td>
<td>450</td>
<td>480</td>
</tr>
<tr>
<td>Yeast, instant</td>
<td>7</td>
<td>7</td>
<td>7</td>
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</tr>
<tr>
<td>Vegetable oil</td>
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<tr>
<td>Salt</td>
<td>15</td>
<td>15</td>
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<td>15</td>
</tr>
<tr>
<td>Sugar</td>
<td>23</td>
<td>23</td>
<td>23</td>
<td>23</td>
</tr>
</tbody>
</table>

- Start with **partial whole grain** recipes (25% or 51%).
- Make **step-by-step** changes to decrease wheat flour and gradually increase whole wheat flour to 100%.
- Slight changes in **water** levels are needed too.
## Pizza Dough: Calculating Whole Grains

<table>
<thead>
<tr>
<th>Ratio of Whole Wheat/Refined Flour</th>
<th>Percentage of Whole Wheat Flour in Pizza Dough</th>
<th>Whole Grain (grams/serving)*</th>
<th>Dietary Fiber (grams/serving)*</th>
<th>Product Information per 2 oz serving weight of crust</th>
</tr>
</thead>
<tbody>
<tr>
<td>0/ 100</td>
<td>0</td>
<td>0</td>
<td>0.9</td>
<td>--------</td>
</tr>
<tr>
<td>25/ 75</td>
<td>14.9</td>
<td>9</td>
<td>1.8</td>
<td>9 grams of whole grain per serving ½ ounce-equivalent of whole grain ½ Grains/ Breads (CN)</td>
</tr>
<tr>
<td>51/ 49</td>
<td>30</td>
<td>18</td>
<td>2.6</td>
<td>18 grams of whole grain per serving 1 ounce-equivalent of whole grain 1 Grains/ Breads (CN)</td>
</tr>
<tr>
<td>100/ 0</td>
<td>57</td>
<td>35</td>
<td>4.2</td>
<td>100% Whole Grain Crust 35 grams of whole grain per serving 2 ounce-equivalents of whole grain 2 Grains/ Breads (CN)</td>
</tr>
</tbody>
</table>

* 62 grams pizza dough = 1 slice or 55 gram baked crust (approx 2 oz.)
Other Acceptability Solutions

• Be creative with recipes.
  – Use whole grains in a variety of recipes.

• Vary the type of wheat used.
  – Products made with whole wheat flour from white wheat are lighter in color than traditional red whole wheat flour.

• Use finely milled whole grain flours.
  – Product made with finely milled whole grain flour have a smoother texture and appearance (bran specks are not visible).

• Use other whole grains that may be new.
  – e.g., Amaranth, Quinoa, Barley, Rye
Gradual Change Means Acceptability

• Gradually incorporate whole grains into foods.
  – Prepare or use partial whole grain foods
e.g., 1/4th – 1/3rd of the flour can be substituted with whole
grain flour with minimal changes to recipe and product.

• Begin with popular items such as pizza crust, tortillas,
pasta, buns.

• Make changes in steps over 3 to 6 months.

• Work with vendors to develop whole grain mixes and
ready-made items.
Section 6. Menu Planning and Food Preparation

• Substitutions
• Preparation tips
• Storage and shelf life
• Cost and availability
Whole Grain Substitutions

• Recommend more products made with whole grains in diets and menus by including:
  – Buns, rolls and bread products
  – Tortillas and wraps
  – Pasta
  – Rice
  – Pizza crust
  – Ready-to-eat (RTE) cereal
Preparing Whole Grain Breads

• Whole grain bread recipes require more liquid.
  – 62:100 water to flour ratio for white bread
  – 68-70:100 water to flour ratio for 100% whole wheat bread

• Whole grain recipes may need additional ingredients.
  – May need 3-5% gluten for 100% whole wheat breads

• Less mixing time is needed; avoid over-mixing the dough.

• Lower oven temperature slightly (25-50°F) to lower crust browning.
Preparing Whole Grain Pasta

• Amount of water recommended is 4-6 quarts per pound of dry pasta.

• Cooking time varies based on product.
  – Pasta made with whole grain generally requires less cook time.
  – Pasta shape influences cook time.
  – Texture preference influences cook time (soft vs. firm)

• Tips:
  – Do not overcook or hold too long
  – Add sauces to enhance flavor and help prevent stickiness.
Preparing Whole Grain Brown Rice

• Whole grain brown rice requires longer cooking time and more liquid compared to white rice.

• Amount of liquid and cook time needed changes based on cooking method (steamer vs. stove-top) and type of rice. Follow recommended directions for best results.

• Quick-cooking and pre-cooked whole grain brown rice products are available.

• Popular seasonings or cooking in broth may help to enhance flavor.
Storage and Shelf-Life of Whole Grain Ingredients

• Whole grain ingredients have shorter shelf-lives compared to refined grain ingredients.
  – The bran and germ in whole grains contain unsaturated fats that can change with time and increased storage temperature.

• Store cool (<75°F) and dry (<50% humidity).
• Do not store near spices or other aromatic foods.
• Use first in/first out ingredient rotation.
• Refrigerate or freeze whole grains to extend shelf-life.
Cost and Availability

• Cost depends on grain type, package size and quantity.

• Availability of whole grain products has increased.
  – There were 650 retail whole grain product introductions in 2009 - this is more than 4 times the number of new whole grain products introduced in 2004.

Source: Mintel Global New Products Database
2009 Whole Grain Retail Product Introductions

- Baby Food 21
- Bakery 236
- Breakfast Cereals 138
- Dairy 7
- Meals & Meal Centers 31
- Sauces & Seasonings 5
- Side Dishes 76
- Snacks 105
- Soup 7

Source: Mintel Global New Products Database
Section 7. Acceptance of New Products

• Familiarity
• Menu considerations
• Marketing and promotion
Preparation and Service

• Help make whole grain foods more familiar:
  – Similar size and texture
  – Make foods with partial whole grains
  – Develop recipes with light colored, finely-ground whole grain flour
  – Serve foods with sauces, toppings to help minimize differences
  – Serve as main dishes, side dishes, accompaniments, desserts, snacks
Preparation, School Foodservice and Beyond

• Accompanying food items
  – Mask color and flavor
    • sauce and cheese on pizza crust
    • burgers with condiments on buns

• Serving options
  – Child can choose to take food or be given food item

• Position on the serving line
  – Opt for the beginning of the line, with main dish

• Quality – freshness, texture, flavor
Marketing and Promotion

- Sneak preview - offer samples of whole grain products.
- Serve items frequently to encourage intake.
- Communication tools – recipes, blogs, in-store dieticians
- Reinforce messages for kids:
  - Classroom lessons
  - Newsletters to parents
  - Signs, posters, bulletin boards
  - Contests, endorsements, menu makeovers
Summary

• Whole grains contain the endosperm, bran and germ.

• Half of daily grain intake should be whole grain.

• Whole grain foods offer health benefits.

• Whole grain foods can be identified by:
  – Product name, amount, ingredients, symbols and health claims
Summary (continued)

• Introduce whole grains gradually in familiar foods to improve acceptance.

• Make recipe and storage adjustments for success.

• Work with vendors to provide whole grain items and mixes for use in school cafeterias and other foodservice.

• Offer samples of whole grain foods and promote benefits to reach consumers with whole grain messages.

• Whole grain foods are important to health throughout the lifespan, ranging from infants, to employees at worksites, to individuals in assisted living and nursing facilities.
Questions?
This webinar covered:

- Whole grains contain the endosperm, bran and germ.
- Half of daily grain intake should be whole grains.
- Whole grain foods offer health benefits.
- Whole grain products can be identified by name, amount, ingredients, health claims, symbols.
- Introduce whole grains gradually in familiar foods to improve acceptance by children.
- Work with suppliers to provide whole grain items and mixes for use in institution cafeterias.
Contact Information

- For CPE information: astachnik@rippelifestyle.com

- For recorded webcast and pdf download of PowerPoint: www.ConAgraFoodsScienceInstitute.com

- For future ConAgra Foods Science Institute Nutri-Bites\textsuperscript{sm} webinars: www.ConAgraFoodsScienceInstitute.com
Next **Nutri-Bites** Webinar

What’s In the Home is What’s On the Plate
Paul Estabrooks, PhD
Associate Professor
Virginia Tech

Date: October 20, 2010
2-3 pm EST
ConAgra Foods Science Institute

Promoting Dietary and related Choices affecting Wellness by linking evidence-based Understanding with Practice