

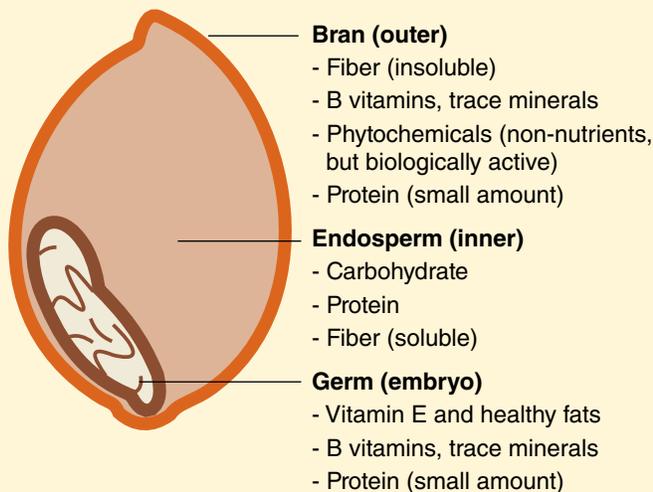


# Whole Grains: Agriculture to Health

Revised by  
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## Whole-grain Components

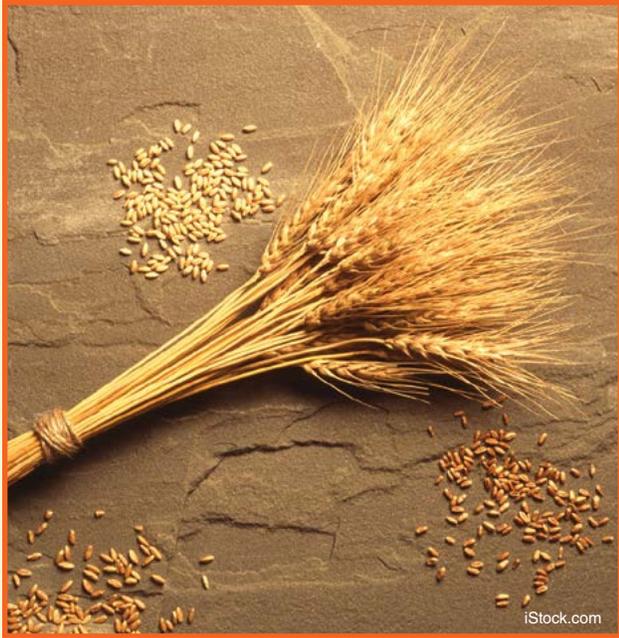
Whole grains contain all elements of the kernel —bran, germ and endosperm. The bran and germ contain a variety of health-enhancing components— dietary fiber, phytochemicals, vitamins, trace minerals and small amounts of unsaturated fat.



Refined grains primarily contain the ground endosperm of the kernel, with both the bran and germ removed. Loss of the bran and germ reduces the fiber content (especially insoluble fiber) and a number of health-enhancing components. Refined grains are “enriched” with a limited number of nutrients—vitamins (thiamin, riboflavin, niacin) and minerals (iron) —added back. Refined grains also are “fortified” with folic acid at more than twice the level found in whole grains.

## Grain Production

In 2021, North Dakota led the nation in wheat production, harvesting about 600,000 tons of wheat on nearly one million acres of land. North Dakota also produces a small amount of rye.



## Daily Amounts

For adults, the Dietary Guidelines suggest about “6 ounce equivalents” of total grains per day. Variation in calorie needs will change this suggested amount. Three or more one ounce equivalents of whole grains are recommended each day.

One “ounce equivalent” of grain-based foods is as follows:

- 1 ounce or slice of bread
- ½ cup of cooked rice, pasta or cooked cereal
- 1 cup of ready-to-eat cereal

## Whole-grain Identification

The Whole Grains Council is an industry-based group committed to increasing the consumption of whole grains. This group has developed the Whole Grains Stamp Program to help consumers identify whole-grain products and the amount of whole grains per serving.

Whole Grain Stamps indicate the following:

- Number of grams of whole grains per serving
- Daily goal of 48 or more grams of whole grains
- 100% stamp indicates a product having only whole grains with 16 or more grams per serving



EAT 48g OR MORE OF WHOLE GRAINS DAILY

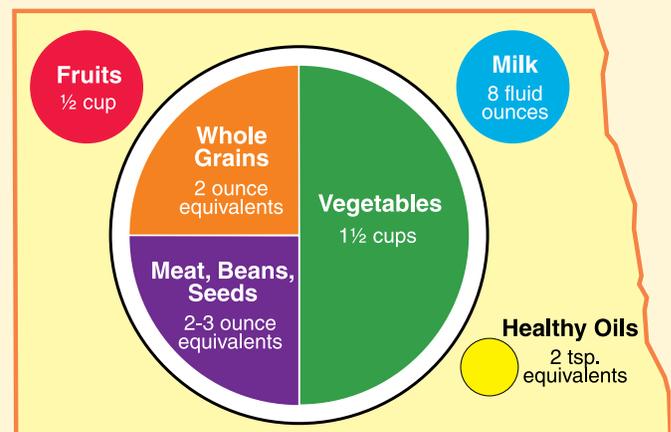


EAT 48g OR MORE OF WHOLE GRAINS DAILY

Whole Grain Stamps are a trademark of Oldways Preservation Trust and the Whole Grains Council.

## Healthy North Dakota Plate

Seeing foods on a plate may assist with planning and selecting meals to meet the Dietary Guidelines for Americans. The amounts suggested are for one meal in a daily pattern with about 2,000 calories. Foods produced in North Dakota and the northern Plains are featured. Grains, with an emphasis on whole grains, should cover about one-fourth of the plate.



## Health Benefits

Including whole grains in the diet on a regular basis is associated with lower body weights and reduced risk of heart disease, diabetes and some types of cancer.

### Healthy Weight

The dietary fiber found in whole grains helps promote a full feeling, which reduces the amount of food eaten. The role that other components of whole grains contribute to weight management is not well defined.

### Heart Health

Dietary fiber found in whole grains (especially the soluble fiber found in oats and barley) may help reduce the absorption of dietary cholesterol. The bran and germ contribute a variety of substances which also play a role in reducing the risk of heart disease: trace minerals, a variety of phytochemicals and a small amount of healthy oils.

### Diabetes

Consuming whole grains, within an overall balanced diet, is one way to reduce the risk of developing diabetes. Dietary fiber (especially soluble dietary fiber found in whole oats and barley) helps reduce the rate of carbohydrate absorption and supports appropriate insulin response to carbohydrate in the diet.

### Bowel Health

Increased intake of whole grains with higher contents of insoluble fiber (such as whole wheat or brown rice) can prevent or treat constipation. Both the soluble and insoluble fiber found in a variety of whole grains promote overall bowel health, including a reduction in the risk of colon cancer.

### Cancer

Phytochemicals (antioxidants and phytoestrogens) and trace minerals (such as selenium) found in whole grains may inhibit the development or progression of various types of cancer. Insoluble fiber (found in large amounts in whole wheat and brown rice) increases fecal bulk and speeds up transit in the colon. Cancer-causing agents thus have less time in contact with cells lining the large intestine. Bacteria breaks down soluble fiber (found in large amounts in oats and barley) in the large intestine and helps enhance the health of colon cells.

## Carbohydrate Exchanges

Whole grains (contributing good amounts of fiber, vitamins, minerals and phytochemicals) are an excellent carbohydrate choice for those living with diabetes.

### Carbohydrate Exchanges Whole Grains

Whole-wheat bread, 1 slice (1 ounce)

Oatmeal, cooked,  $\frac{1}{2}$  cup

Whole-wheat pasta, cooked,  $\frac{1}{3}$  cup

80 calories

15 grams carbohydrate

2 grams dietary fiber

3 grams protein

0-1 gram fat

Exchange: 1 starch



## Warm Pear Crisp

Makes nine servings

- ¼ cup rolled oats
- 1 tablespoon walnuts
- 7 tablespoon whole-wheat flour
- 2½ tablespoon packed brown sugar
- 1/8 teaspoon ground cinnamon
- 1 tablespoon plus 2 tsp. canola oil
- 6 medium pears, cored and sliced
- ¼ cup raisins
- 1 tablespoon lemon juice
- 2 tablespoon sugar
- 1/8 teaspoon nutmeg
- pinch of cloves

### Directions

- Combine oats, walnuts, 6 tablespoon whole-wheat flour, brown sugar and cinnamon.
- Add oil and mix thoroughly.
- In a separate bowl, toss pears with raisins, lemon juice, sugar, 1 tablespoon whole-wheat flour, nutmeg and cloves.
- Spoon pear mixture into one 8- or 9-inch round cake pan sprayed with canola oil.
- Cover pear mixture with the oat mixture and press down gently.
- Bake at 375 F for 45 to 50 minutes. Crisp is done when topping has browned and pear juice bubbles to the top.

### Nutrition Information Per Serving

Makes nine servings. Each serving has 170 calories, 3.5 grams (g) fat, 2 g protein, 34 g carbohydrate, 5g fiber, and 0 milligrams sodium.  
**Exchanges:** 1 starch, 1 fruit, 1 fat  
Source: Adapted from [www.aicr.org](http://www.aicr.org)

## Easy Spinach Lasagna

Makes 12 servings

- 2 teaspoon oil
- 1 small onion, chopped
- 3-4 garlic cloves, minced
- 2 (10-ounce) packages frozen, chopped spinach, thawed and well-drained
- ¼ teaspoon nutmeg
- 1 pound small-curd cottage cheese
- 2 cups shredded part-skim mozzarella cheese
- ¼ cup grated Parmesan or Romano cheese
- 2 eggs
- 1 teaspoon dry oregano
- 1 teaspoon dry basil
- Salt and freshly ground pepper to taste
- 3 cups low-fat prepared marinara sauce
- 12 pieces dry whole-wheat lasagna noodles

### Directions

- Preheat the oven to 375 F.
- In a skillet, cook the onion and garlic in the oil over medium heat until opaque.
- Add spinach (thawed and drained) and nutmeg to the onion/garlic mixture. Cook until liquid is absorbed, about three minutes.
- Allow spinach mixture to cool, about 15 minutes.
- In a bowl, combine the cottage cheese, 1 cup mozzarella, Parmesan cheese, eggs, oregano, basil, salt and pepper.
- Set aside ½ cup of marinara for the top of the lasagna.
- In a 9-inch by 13-inch glass baking pan, pour a thin coating of marinara sauce. Cover it with three uncooked lasagna noodles. Top the noodles with one-third of the spinach mixture, followed by one-third of the cheese mixture.
- Repeat the layering process three times.
- Pour the reserved ½ cup of marinara sauce over the top and distribute 1 cup shredded mozzarella cheese on top of that.
- Cover with foil and bake 30 minutes. Remove foil and continue baking until the noodles are tender, 12 to 15 minutes. Cool and cut into sections.

### Nutrition Information Per Serving

Makes 12 servings. Each serving has 300 calories, 12 grams (g) fat, 22 g protein, 29 g carbohydrate, 2 g fiber and 680 milligrams sodium.  
**Exchanges:** 2 starch, 1 meat (medium fat)  
Source: Adapted from [www.aicr.org](http://www.aicr.org)

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For more information on this and other topics, see [www.ag.ndsu.edu/food](http://www.ag.ndsu.edu/food)

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