

Coarse grains have been harvested for thousands of years to serve as food for all cultures of the world and a feed source for animals. Today, they continue to play important roles worldwide. This issue of the *Grain News* focuses on the contributions of barley and sorghum to human nutrition.

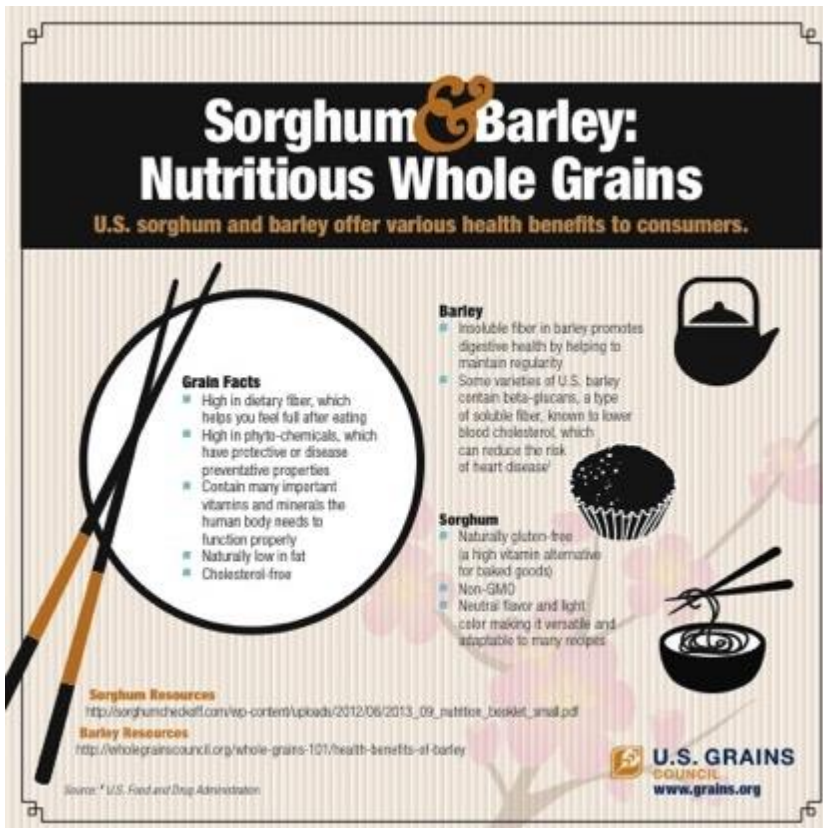
The Barley Nutrition Bundle

Barley has been a long-time ingredient in animal feed rations and beer, a beverage enjoyed worldwide. But this ancient grain is also garnering attention by health professionals for its nutritional benefits for human health.

In scientific studies barley has been shown to reduce the risk of many diseases and provide important benefits to human health including reducing blood pressure, controlling blood sugar and lowering cholesterol. Universities such as Columbia, Stanford, California and University of Connecticut in the United States, Oxford Brookes (United Kingdom), Tokushima (Japan) and Lund (Sweden), in addition to the U.S. Department of Agriculture (USDA) conducted the research studies.

Barley offers many of the same healthy vitamins and minerals as other whole grains. However, barley also offers special health benefits because of its high levels of the soluble fiber, beta glucan. Even though some milling processes remove all or part of the bran layer, the health benefits apply because the fiber is distributed throughout the grain kernel and some bran may remain in the milled product.

Barley appears to have benefits for heart-health because beta glucan significantly lowers total cholesterol



**Sorghum & Barley:
Nutritious Whole Grains**
U.S. sorghum and barley offer various health benefits to consumers.

Grain Facts

- High in dietary fiber, which helps you feel full after eating
- High in phyto-chemicals, which have protective or disease preventative properties
- Contain many important vitamins and minerals the human body needs to function properly
- Naturally low in fat
- Cholesterol free

Barley

- Insoluble fiber in barley promotes digestive health by helping to maintain regularity
- Some varieties of U.S. barley contain beta-glucans, a type of soluble fiber, known to lower blood cholesterol, which can reduce the risk of heart disease*

Sorghum

- Naturally gluten-free (a high vitamin alternative for baked goods)
- Non-GMO
- Neutral flavor and light color making it versatile and applicable to many recipes

Sorghum Resources
http://sorghumshedeckoff.com/wp-content/uploads/2012/06/2013_09_nutritive_basket_small.pdf

Barley Resources
<http://wholegrainscouncil.org/whole-grains-101/health-benefits-of-barley>


Source: *U.S. Food and Drug Administration


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and low-density lipoprotein (LDL) levels by binding to bile acids and removing them from the body. In 2006, the U.S. Food and Drug Administration (FDA) approved a health claim that consuming barley-containing beta glucan may reduce one's chances of developing heart disease.

Health professionals recommend eating at least 25 grams of dietary fiber every day, including a combination of soluble and insoluble fiber. In addition to being an excellent choice for both types of fiber, barley is a good source of many nutrients such as selenium, phosphorus, copper and manganese.

Barley is one of only two grains that contain significant levels of soluble fiber, which helps lower cholesterol; slows the process of digestion resulting in slower absorption of sugar, which may reduce the risk for developing non-insulin dependent diabetes; and helps maintain regular bowel function, which may help lower the risk for certain cancers such as colon cancer.

Finally, barley contains antioxidants, which are important to maintaining good health. The antioxidants work to slow down the rate of damage caused by free radicals that form when body cells use oxygen.

Because barley is available in several forms including pearled (in which all or part of the bran layer has been polished away), flour and flakes, it may be used in many different



Pearled barley, hullless and hulled barley whole grain.
Photo courtesy of National Barley Foods Council.

Health professionals recommend eating at least 25 grams of dietary fiber, every day, of which barley is a good source.

Whole Grains Defined

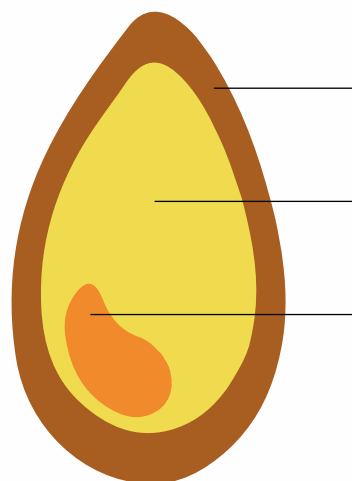
Whole grains – and the foods made from them – contain all essential parts of the grain seed. They have 100 percent of the original kernel, which includes the bran, germ and endosperm.

All three kernel layers must be intact to qualify as “whole grain.” Because these layers are complete, whole grains contain more nutrients than grains that have been stripped of the bran and germ layers through processing.

Wheat, oats/oatmeal, rye, barley, corn, brown rice, bulgur, millet, quinoa and sorghum are grains commonly available in whole form.

Many whole grains are good or excellent sources of dietary fiber, which may help improve blood cholesterol levels, and lower risk of heart disease, stroke, obesity and Type II diabetes.

For additional information on whole grains visit www.wholegrainscouncil.org/whole-grains-101. ■



Whole Grain

Bran

The fiber-rich outer layer that protects the seed and contains antioxidants, B vitamins, phytochemicals and trace minerals

Endosperm

The middle, largest layer containing mostly carbohydrates, protein and small amounts of some B vitamins and minerals

Germ

The small, nutrient-rich inner component containing healthy fats, B vitamins, phytochemicals and antioxidants like vitamin E

recipes for all meal occasions. It has a rich, nutty flavor and consistency similar to pasta. In particular, the grain makes a great addition to soups or other dishes that normally call for rice, such as stir-fry or pilaf.

For additional information on the nutritional benefits of barley, visit www.barleyfoods.org. ■

Sorghum: A Gluten-Free Whole Grain

Sorghum is recognized as an important farm crop in the United States and has expanded to become one of the top five crops grown worldwide.

Although sorghum has been predominately grown for livestock feed and ethanol production in the United States, it is mainly used for human food elsewhere in the world. This is partly because the crop can grow in harsh environments with drought conditions where other grains do not typically perform as well.

Sorghum provides a powerhouse of nutrition, is high in antioxidants and serves as a good source of fiber and protein.

Additionally, it has gained popularity due to its status as a naturally gluten-free grain, making it highly appealing to individuals who live with celiac disease, gluten intolerance or gluten sensitivity.

Gluten is the protein found in wheat, rye, barley and other grains. These protein fragments can cause an immune system reaction in a small number of people, damaging the small intestine and preventing proper food digestion and absorption.

Rather than give up their favorite foods like bread, cookies, cake and pizza, individuals allergic to or sensitive to gluten can choose foods prepared with sorghum-based ingredients.

As a whole, unprocessed grain, sorghum has a hearty and chewy texture, which makes it the perfect alternative to grains such as couscous and bulgur wheat in soups and side dishes. Sorghum can also be popped like popcorn or even brewed into beer.

White sorghum flour is made from food grade white sorghum that has had the hull removed and milled like other flours. This flour has the size, texture and color of common white-wheat flour but with a slightly nutty flavor. It can be used in a variety of baking applications in conjunction with other flours.

Engineering developments for milling in recent years have resulted in sorghum flour that performs well in baking applications and is appealing in both taste and texture to consumers. Manufacturing companies and home cooks value sorghum flour for its light color, neutral taste and pleasing texture. Several food companies use sorghum in their gluten-free products and baking mixes.

For additional information on the nutritional benefits of food grade sorghum visit www.sorghumcheckoff.com/food/nutrition-information/. ■



Milling Produces Multiple Food Grade Sorghum Options

The global market for gluten-free products has been on the rise in recent years and is expected to reach \$6.2 billion by 2018, according to MarketsandMarkets, a U.S. based global market research company. To meet the increasing demand, food manufacturers are relying on gluten-free ingredients to produce baked goods, cereals, snacks and other products that meet consumer demands.

The majority of milled or processed food grade sorghum is produced from a white or tan variety of the grain, but darker kernels are also used. It can be milled into a variety of forms such as flour, flakes, cracked kernels and even popping kernels.

The basic kernel structure of sorghum includes an outer bran layer, sometimes referred to as pericarp, a middle layer called endosperm and a smaller innermost layer called the germ. While companies have proprietary techniques that make their products unique, there are some commonalities to milling. During milling processes, the layers are cracked, ground or removed, resulting in a wide variety of products.

Additionally, many of the available nutrients and antioxidants in sorghum exist in the outer bran layer of the grain, so the physical change in the grain layers from the milling process results in a slight increase in nutrient absorption when consumed.

Whole grain sorghum flour is processed to control particle size and distribution, as well as manage starch content and texture. The result is a product that is an ideal alternative to traditional flour.

To maintain quality and consistency some grain millers contract with growers for a specific variety and quality of sorghum grain, growing protocols and management conditions. "We mill sorghum flour to exact specifications set by our commercial customers to work best for the baked goods they produce. We always start with a No.1 quality grain that is grown on contract under strict management protocols and with full traceability," said Earl Roemer, a farmer near Scott City, Kansas, and president of Nu Life Market, a company that mills food grade sorghum.

Because sorghum is gluten-free, pure whole grain sorghum flour lacks the gluten proteins that serve as binders in traditional flour. Therefore millers add psyllium fiber, xanthan gum or starches to the flour mix so it is ready to use by retail customers. Commercial food companies also usually add these binding ingredients into their proprietary flour blends at various levels depending on the recipe.

Flaked sorghum is a milled product often incorporated into ready-to-eat cereal, baked goods, snack foods and nutrition or energy bars. Another common milled ingredient for ready-to-eat cereal is cracked grain sorghum. Popping kernels have the hulls removed and are typically incorporated into snack foods.

Removing the bran layer through milling results in a product called pearled sorghum. It serves as a substitute for rice and pasta and can be used in salads.



Milled food grade sorghum products. From left to right: white whole grain sorghum flour, pearled sorghum and popping sorghum. Photos courtesy of Nu Life Market.

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The bran by-product from making pearled sorghum is sold in powdered form, which is high in fiber and antioxidants. This powdered sorghum bran, usually available in health food and specialty stores, can be added to cereal, yogurt and other similar foods.

In the United States, health and sanitation inspection in the milling industry falls under the jurisdiction of the U.S. Food and Drug Administration (FDA). Mill operators often go beyond the FDA standards and have independent audit programs that may provide value to international customers.

For additional information on food grade milled sorghum products visit www.sorghumcheckoff.com/food/types-of-sorghum/. ■

Sorghum Pilaf

1 cup uncooked sorghum grain
 2 1/2 tablespoons olive oil
 3 to 4 cups chicken broth
 1 cup carrots, thinly sliced
 1/2 cup celery, sliced
 1 clove garlic, minced
 3 green onions, sliced
 1/3 cup pine nuts or slivered almonds, toasted
 1 1/2 cups cherry tomatoes, halved
 Salt to taste
 Dash freshly cracked pepper



Sorghum Pilaf. Photo courtesy of United Sorghum Checkoff

Rinse sorghum kernels and drain thoroughly. In a heavy 3-quart saucepan over medium-low heat, combine sorghum and 1 tablespoon olive oil. Stirring constantly, gently toast sorghum in oil for 2 to 3 minutes or until lightly browned. Add chicken broth and reduce heat. Cover and simmer for 45 to 50 minutes or until broth is absorbed and grain is tender. Drain excess liquid, if necessary; set aside. In large skillet, heat 1 1/2 tablespoons olive oil over medium-high heat. Add carrots, celery and garlic and sauté for 3 to 5 minutes until tender crisp. Add green onions, nuts and tomatoes. Cook for 2 to 3 minutes or until nuts begin to toast. Add cooked sorghum and heat through. Season to taste. Transfer to casserole dish or large platter. Garnish with sprigs of parsley and additional toasted nuts. Serve hot. Makes 6 servings.

Recipe courtesy of the United Sorghum Checkoff. For more recipes and information about sorghum, visit www.sorghumcheckoff.com. ■

Sorghum Blueberry-Lemon Muffins

Dry Ingredients

2 1/3 cups sorghum flour blend
 3/4 cup granulated sugar
 1 tablespoon baking powder
 1 1/2 teaspoons xanthan gum
 3/4 teaspoon salt

Wet Ingredients

1 cup milk of choice, at room temperature
 1/3 cup canola oil
 2 large eggs, at room temperature
 1 tablespoon grated lemon peel

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1 teaspoon vanilla extract

Add-Ins and Topping

1 cup fresh blueberries
1 tablespoon sugar for sprinkling on muffins

Preheat the oven to 375°F. Generously grease a standard 12-cup non-stick muffin pan. Whisk the dry ingredients together in a large bowl. In a separate bowl, whisk the wet ingredients thoroughly until smooth.

Make a well in the dry ingredients and add wet ingredients. Combine with a spatula until just moistened and then gently stir in the blueberries. Divide the batter evenly in the pan and sprinkle each muffin with a little sugar.

Bake until the muffin tops are lightly browned, approximately 20 to 25 minutes or until a toothpick inserted in the center of a muffin comes out clean.

Recipe courtesy of the United Sorghum Checkoff. For more recipes and information about sorghum, visit www.sorghumcheckoff.com.



Sorghum Blueberry-Lemon Muffins. Photo courtesy of United Sorghum Checkoff

Herbed Barley Scotch Broth

Nonstick cooking spray
2 leeks, thinly sliced, white part only
2 cloves garlic, chopped
2 carrots, thinly sliced
1 fennel bulb, quartered and thinly sliced
1 stalk celery, thinly sliced
1/2 pound boneless lean lamb, cut into 1-inch cubes
6 cups fat-free chicken broth
1/2 cup pearl barley
1 teaspoon salt
1/2 teaspoon ground black pepper
Herb bundle: 6 sprigs thyme, 4 sprigs Italian parsley and 1 sprig rosemary

Spray inside of large soup pot with nonstick cooking spray. Add leeks, garlic, carrots, fennel and celery. Sauté over medium-high heat for 5 to 6 minutes, stirring until browned. Remove vegetables from pan and set aside. Add lamb to pan; brown, stirring occasionally. Return vegetables to pan. Add broth, barley, salt, pepper and herb bundle. Cover and bring to a boil. Reduce heat and simmer for 1 hour. Remove herb bundle and serve in soup bowls. Makes 8 servings.

Recipe courtesy of the National Barley Foods Council. For more recipes and information about barley, visit www.barleyfoods.org.



Herbed Barley Scotch Broth. Photo courtesy of National Barley Foods Council