

Wheat Flour

Definitions

Flour is the product obtained by grinding wheat kernels or “berries.” The kernel consists of three distinct parts: bran, the outer covering of the grain; germ, the embryo contained inside the kernel; and endosperm, the part of the kernel that makes white flour. During milling, the three parts are separated and recombined accordingly to achieve different types of flours. This has no effect on nutrient and or vitamin value. The only loss is a minute amount of vitamin E.

There are six different classes of wheat: Hard Red Winter, Hard Red Spring, Soft Red Winter, Hard White, Soft White and Durum. The end products are determined by the wheat’s characteristics, especially protein and gluten content. The harder the wheat, the higher the protein content in the flour. Soft, low protein wheats are used in cakes, pastries, cookies, crackers and Oriental noodles. Hard, high protein wheats are used in breads and quick breads. Durum is used in pasta and egg noodles.

History

Ground grain was one of civilized man’s first foods. Ancient methods of grinding can be traced to the Far East, Egypt and Rome. As early as 6,700 B.C., man ground grains with rocks. Water mills did not appear until 85 B.C. in Asia Minor. Windmills appeared between 1180 and 1190 A.D. in Syria, France and England.

Storage

Flour should be stored in airtight containers in a cool, dry place (less than 60 percent humidity). All purpose, bread and cake flour will keep for 6 months to a year at 70°F and 2 years at 40°F; store away from foods with strong odors. Whole-wheat flour should be refrigerated or frozen, if possible. Before using refrigerated or frozen flour, allow it to warm to room temperature and inspect for rancidity and taste.

Nutritional Value

Wheat flour is an excellent source of complex carbohydrates. Other than gluten flour, all types of wheat flour derive at least 80 percent of their calories from carbohydrates. Depending on the flour type, the percent of calories from protein ranges from 9 to 15 percent, except from gluten flour, which has 45 percent protein content. Calories from fat are never more than 5 percent.

In addition, wheat flour provides from 3 g (cake flour) to 15 g (whole-wheat flour) of dietary fiber per 1 cup serving. Wheat flour contains four B-vitamins, (thiamin, riboflavin, niacin and folacin), calcium, iron, magnesium, phosphorus, potassium, zinc, minimum amounts of sodium and other trace elements.

Types of Flour

- White flour is the finely ground endosperm of the wheat kernel.
- All-purpose flour is white flour milled from hard wheats or a blend of hard and soft wheats. It gives the best results for many kinds of products, including some yeast breads, quick breads, cakes, cookies, pastries and noodles. All-purpose flour is usually enriched and may be bleached or unbleached. Bleaching will affect nutrient value. Different brands will vary in performance. Protein varies from 8 to 11 percent.
- Bread flour is white flour that is a blend of hard, high-protein wheats and has greater gluten strength and protein content than all and in some cases conditioned with ascorbic acid, bread flour is milled primarily for commercial bakers, but is available at most grocery stores. Protein varies from 12 to 14 percent.
- Cake flour is fine soft wheats with low protein content. It is used to make cakes, cookies, crackers, quick breads and some types of pastry. Cake flour has a greater percentage of starch and less protein, which keeps cakes and pastries tender and delicate. Protein varies from 7 to 9 percent.
- Self-rising flour, also referred to as phosphated flour, is a convenience product made by adding salt and leavening to all-purpose flour. It is commonly used in biscuits and quick breads, but is not recommended for yeast breads. One cup of self-rising flour contains 1½ teaspoons baking powder and ½ teaspoon salt. Self-rising can be substituted for all-purpose flour by reducing salt and baking powder according to these proportions.
- Pastry flour has properties intermediate between those of all-purpose and cake flours. It is usually milled from soft wheat for pastry-making, but can be used for cookies, cakes, crackers and similar products. It differs from hard wheat flour in that it has a finer texture and lighter consistency. Protein varies from 8 to 9 percent.



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GRAINS of TRUTH

Types of Flour (con't)

- Semolina is the coarsely ground endosperm of durum, a hard spring wheat with a high-gluten content and golden color. It is hard, granular and resembles sugar. Semolina is usually enriched and is used to make couscous and pasta products such as spaghetti, vermicelli, macaroni and lasagna noodles. Except for some specialty products, breads are seldom made with semolina.
- Durum flour is finely ground semolina. It is usually enriched and used to make noodles.
- Whole wheat, stone-ground and graham flour can be used interchangeably; nutrient values differ minimally. Either grinding the whole-wheat kernel or recombining the white flour, germ and bran that have been separated during milling produces them. Their only differences may be in coarseness and protein content. Insoluble fiber content is higher than in white flours.
- Gluten flour is usually milled from spring wheat and has a high protein (40-45 percent), low starch content. It is used primarily for diabetic breads, or mixed with other non-wheat or low-protein wheat flours to produce a stronger dough structure. Gluten flour improves baking quality and produces high-protein gluten bread.

Substituting

- Any recipe calling for all-purpose flour may use $\frac{1}{2}$ whole-wheat flour and $\frac{1}{2}$ all-purpose flour.
- To obtain a 100% whole wheat product substitute 1-cup whole-wheat flour minus 1-tablespoon for every cup of all-purpose or bread flour the recipe calls for.
- To create a lighter whole-wheat loaf, add 1 tablespoon gluten flour and 1-tablespoon liquid for each cup of whole-wheat flour.

Wheat Flour Terms

The Food and Drug Administration inspects and approves the use of flour treatments and additives that are used to improve the storage, appearance and baking performance of flour. The treatment additives are in no way harmful.

- **“Enriched”** flour is supplemented with iron and four B-vitamins (thiamin, niacin, riboflavin and folic acid). These nutrients are added back to the processed flour in amounts equal to or greater than amounts found in the unprocessed flour.
- **“Fortified”** implies that something has been added to a product that makes its nutritional status higher than the product made from “unprocessed” raw materials. i.e. Cereals. Calcium and folic acid are examples of nutrients added to fortified flour.
- **“Pre-sifted”** flour is sifted at the mill, making it unnecessary to sift before measuring.
- **“Bromated”** flour is largely discontinued in the United States. Ascorbic acid is now being added to strengthen the flour for bread doughs.
- **“Bleached”** refers to flour that has been bleached chemically to whiten or improve the baking qualities. It is a process which speeds up the natural lightening and maturing of flour. No change occurs in the nutritional value of the flour and no harmful chemical residues remain.
- **“Unbleached”** flour is aged and bleached naturally by oxygen in the air. It is more golden in color, generally more expensive and may not have the consistency in baking qualities that bleached flour does. Unbleached is preferred for yeast breads because bleaching affects gluten strength.
- **“Patent”** flour, bleached or unbleached, is the highest grade of flour. It is lower in ash and protein with good color. Market-wise, it is considered the highest in value and mostly used by bakers.
- **“Organic”** or chemical-free flour is not standardized, so its definition varies from state to state. It may be grown and stored without the use of synthetic herbicides or insecticides. It may also mean no fumigants were used to kill pests in the grain and no preservatives were added to the flour, packaging, or food product.
- **“Gluten”** is a protein found in wheat, barley and rye. Gluten gives bread dough elasticity, strength and gas-retaining properties. Wheat is the only grain with sufficient gluten content to make raised or leavened loaves of bread.

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