

# Wheat



## History

Wheat production in Canada dates back to the early 17<sup>th</sup> century. It spread westward from present-day Quebec, reaching Manitoba in the early 19<sup>th</sup> century with the Selkirk settlers. The first recorded attempt at growing wheat in present-day Saskatchewan took place in the Carrot River Valley sometime between 1753 and 1756, and is ascribed to the Frenchman Chevalier de La Corne. Commercial production of spring wheat likely started in the 1880s with the introduction of the cultivar Red Fife. Wheat rapidly became the most important crop grown in Saskatchewan, reaching four million hectares by 1919.

## Production

Wheat is currently grown from the United States-Canadian border north to the fringes of the cultivated land base, across all Saskatchewan soil types; this reflects the crop's wide adaptation. The majority of the wheat produced in Saskatchewan is grown under dryland conditions. Wheat is grown twelve months of the year when one takes into account spring and winter wheat. Durum is concentrated in the traditionally lower-rainfall portions of the province, in the Brown and Dark Brown soil zones.



## Processing

The kernel is the wheat seed. That is what gets planted and grows to become the wheat plant. Some wheat plants can grow as tall as seven feet but most commercial varieties reach a height of two to four feet. The wheat head, the part of the plant harvested for food production, can yield 25 to 50 seeds. The seeds/kernels are small and dry and well suited for storage and transport.

Wheat seeds get milled into flour. The process follows these basic steps; however, milling is far more complex than this simplified view conveys:

**Preparing the wheat:** where the wheat is weighed, inspected, and graded.

**Cleaning:** the removal of impurities like stones, dirt, metals, and other seeds.

**Tempering:** during this stage the wheat is soaked in water to make it easier to remove the outer bran layer.

**Gristing:** this involves mixing different wheat to create a specific kind of flour.

**Milling:** involves a number of repeated steps:

*Grinding:* wheat is ground by a machine equipped with rollers that break it into pieces.

*Sifting:* the wheat is then put through sifters. The resulting meal starts out coarse and with repeated grinding and sifting becomes fine white flour, wheat bran, and wheat germ. The milling process can either produce distinct products – wheat bran, refined white flour, wheat germ – that can be packaged and sold separately, milled together to produce a whole grain flour, or blended to form different flours.

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*Blending:* different components are blended back together to form different flours.

For example, whole wheat flour is a blend of white flour and wheat bran.

*Enriching and fortifying:* the addition of vitamins and minerals identified in government regulations.

## The Wheat Kernel

Sometimes called the wheat berry, the kernel is the seed from which the wheat plant grows. Each tiny seed contains three distinct parts that are separated during the milling process to produce flour.

**Endosperm:** This is about 83% of the kernel weight and the source of white flour. The endosperm contains the greatest share of protein, carbohydrates, and iron, as well as the four major B-vitamins, such as riboflavin, niacin, thiamine, and folic acid. It is also a source of soluble fibre.

**Bran:** Bran is about 14.5% of the kernel weight. Bran is included in whole wheat flour and can also be bought separately. The bran contains dietary fibre, a small amount of protein, significant quantities of vitamin E, B-vitamins, minerals, antioxidants, and phytochemicals.

**Germ:** The germ makes up about 2.5% of the kernel weight. The germ is the embryo or sprouting section of the seed, often separated from flour in the milling because the fat content (ten percent) limits flour's shelf-life. The germ contains minimal quantities of protein and a greater share of B-complex vitamins and trace minerals. Wheat germ can be purchased separately and is part of the whole wheat flour.



## Varieties

Wheat is a hardy plant. Over the years, plant researchers have developed new varieties of wheat and improved old varieties in order to produce high-quality, high-yielding wheat that adapts well to Canada's growing season.

In Canada, the types of wheat most often grown are durum wheat and common (non-durum) wheat, which is classified as either hard or soft.

**Hard Wheat:** Includes hard winter wheat and hard spring wheat, which contain more gluten-producing proteins than soft wheat. Used for making bakery flours, bread flours, and all-purpose flours.

**Soft Wheat:** Low in gluten-producing proteins. Usually milled into cake and pastry flours.

**Durum Wheat:** Generally high in gluten-producing proteins. Used for making semolina and flours which are made into Indian flat bread, macaroni, and other pastas.

Durum wheat production in Saskatchewan was initiated in the 1920s and has grown to be the second most widely produced wheat in Canada. Saskatchewan accounts for roughly 84% of Canadian durum wheat production.

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## Nutrition

Whole grains are a major source of complex carbohydrates (starches), fibre, iron, and B vitamins, and are generally low in fat.

However, keep in mind that serving sizes are equal to one ounce and therefore relatively small. One slice of bread weighing one-ounce is a serving, so a sandwich would provide two servings.

### White Bread

To compare, one slice of enriched white bread gets 76 percent of its calories from carbohydrates (mostly complex) and only 11 percent from fat. The rest, 13 percent, is from protein. White bread has 0.5 gram of soluble fibre per slice, which contributes to daily fibre needs of 25 to 38 grams.

### Whole Wheat Bread

The nutritional content of whole wheat breads also varies between brands. An average slice of whole wheat bread gets 69 percent of its calories from carbohydrates and 15 percent from fat because the wheat germ in the whole wheat flour is about ten percent fat. That leaves 16 percent contributed by protein.

The wheat germ contains protein in addition to fat and several minerals; however, the nutrient profile of whole wheat bread remains excellent. It has two grams of fibre, primarily insoluble. Foods containing insoluble fibre have been shown to help prevent colon cancer and possibly breast cancer. Almost a milligram of iron per slice, a substantial amount of folic acid (17.5 micrograms), vitamin E, copper, vitamin B6, and the three major B vitamins make it a nutrient dense food.

The label should list first “whole wheat flour” or contain a combination of whole grain ingredients for it to be a whole grain food. When shopping for whole grain bread, remember that not all brown-based bread is whole wheat. A brown colour may be the effect of caramel coloring, which will be listed on the label. Its nutrient value is similar to white bread.



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## Types of Flour

### All-Purpose Flour

All-purpose flour is the finely ground endosperm of the wheat kernel separated from the bran and germ during the milling process. All-purpose flour is made from hard wheat or a combination of soft and hard wheat from which the home baker can make a complete range of acceptable baked products such as yeast breads, cakes, cookies, and pastries.

*Enriched all-purpose flour* has iron and four major B-vitamins (thiamine, niacin, riboflavin, and folic acid) added in amounts equal to or exceeding that in whole wheat flour. Actually, all enriched flour has twice the folic acid as does whole wheat flour.

*Bleached all-purpose flour* is exposed to chlorine gas or benzoyl peroxide to whiten and brighten flour color. Chlorine also affects baking quality by "maturing" or oxidizing the flour, which is beneficial for cake and cookie baking. The bleaching agents react and do not leave harmful residues or destroy nutrients.

*Unbleached all-purpose flour* is bleached by oxygen in the air during an aging process and is off-white in colour. Nutritionally, bleached, and unbleached flours are equivalent.

### Bread Flour

Bread flour, ground from the endosperm of the hard red spring wheat kernel, is milled primarily for commercial bakers, but is available bleached or unbleached at most grocery stores. It is usually enriched. Although similar to all-purpose flour, it has greater gluten strength and is generally used for yeast breads.

### Self-Rising Flour

Self-rising flour is all-purpose flour with salt and leavening added. One cup of self-rising flour contains 1.5 teaspoons baking powder and 0.5 teaspoon of salt. Self-rising can be substituted for all-purpose flour in a recipe by reducing salt and baking powder according to these proportions.

### Cake Flour

Cake flour, milled from soft wheat, is especially suitable for cakes, cookies, crackers, and pastries. It is low in protein and low in gluten.

### Pastry Flour

Pastry flour has comparable protein, but less starch than cake flour. It is milled from soft, low gluten wheat and is used for pastries.

### Vital Wheat Gluten

Vital wheat gluten is concentrated dried gluten protein with very little remaining starch. It is derived from wheat flour and has similar texture as flour.



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## Whole Wheat Flour

Whole wheat flour is coarse-textured flour containing the bran, germ, and endosperm. The presence of bran reduces the gluten development, therefore, baked products made from whole wheat flour tend to be heavier and denser than those made from white flour.

Whole wheat flour is rich in B-vitamins, vitamin E and protein, and contains more trace minerals and dietary fibre than white flour. It also contains about five percent fat. In most recipes, whole wheat flour can be mixed half and half with white flour. Graham flour is another term for whole wheat flour.

## Farina

Farina is the coarsely ground endosperm of hard wheat. It is the prime ingredient in many hot breakfast cereals. It can also be used for pasta.

## Semolina

Semolina is the coarsely ground endosperm of durum wheat. High in protein, it is used by manufacturers to make high quality pasta products such as macaroni and spaghetti. It is also used for couscous in Africa and Latin America.

## Durum Flour

Durum flour is a by-product in the production of semolina and is used for American noodles, some types of pasta, and occasionally in specialty breads.

## By-Products

Besides flour, wheat is used to make a variety of non-food items including concrete, paper products, adhesives, cosmetics, plastic film and bags, soaps and shampoos.

### Did you know?

A bushel of wheat makes about 90 one pound loaves of whole wheat bread.

## Industry in Saskatchewan

Production: 14,411,200 tonnes (2018)

Number of Producers: 30,000 (2018)

Value to Economy: \$3,200,057,000 in farm cash receipts (2018)

## Industry in Canada

Production: 31,769,100 tonnes (2018)

Value to Economy: \$6,705,413,000 in farm cash receipts (2018)

