**Unit Two: Flour**

* Types of flour
* Brown flour
* White flour
* Wheat flour
* Gluten content of flour

The main cereals, their products & catering use

**Flour**

Flour is a fine powder made from cereals or other starchy food sources. It is most commonly made from wheat, but also maize, rye, barley, and rice, amongst many other grasses and non-grain plants. Flour can also be made from legumes and nuts, such as soy, peanuts, almonds, and other tree nuts.

**Composition of flour**

Flour contains a high proportion of starches, which are a subset of complex carbohydrates also known as polysaccharides. The kinds of flour used in cooking include all-purpose flour (known as plain outside North America), self-rising flour (known as self-raising outside North America), and cake flour including bleached flour. The higher the protein content the harder and stronger the flour, and the more it will produce crusty or chewy breads. The lower the protein the softer the flour, which is better for cakes, cookies, and pie crusts.

**Manufacturing process (milling)**

During the milling process, grains are sorted and cleaned, then sheared open by the rollers, breaking the outer bran layer to the wheat germ and endosperm. These grains are sieved, the bran and germ are removed and endosperm is ground to desired fineness. To make flour whiter, it is stored for a few weeks to oxidize naturally. It may be bleached industrially. Nutrients like niacin, thiamine and iron are added to make up for the loss of bran

**Types of flour**

There are three general types of flour. **White flour** is made from the endosperm only. **Whole grain** flour is made from the entire grain including bran, endosperm, and germ. **Germ flour** is made from the endosperm and germ, excluding the bran.

**Hard** **flour**, or **"bread" flour**, is high in gluten and so forms a certain toughness that holds its shape well once baked.

**All-purpose** or **plain flour** is blended wheat flour with an intermediate gluten level which is marketed as an acceptable compromise for most household baking needs.

**Bleached flour** is flour that was subjected to flour bleaching agents for health purposes, to whiten it (freshly milled flour is yellowish), and to give it more gluten-producing potential..

**Bromated flour** is flour with a maturing agent added. The agent's role is to help with developing gluten, a role similar to the flour bleaching agents. Bromate is usually used. Other choices are phosphates, ascorbic acid, and malted barley. Bromated flour has been banned in much of the world, but remains available in the United States.

**Cake flour** is finely milled flour made from soft wheat. It has very low gluten content, making it suitable for soft-textured cakes and cookies. The higher gluten content of other flours would make the cakes tough.

**Graham flour** is a special type of whole-wheat flour. The endosperm is finely ground, as in white flour, while the bran and germ are coarsely ground.

**Pastry flour** (also called **cookie flour** or **cracker flour**) has slightly higher gluten content than cake flour, but lower than all-purpose flour. It is suitable for fine, light-textured pastries.

**Self-rising** or **self-raising flour** is "white" wheat flour that is sold premixed with chemical leavening agents. For 100 g flour 3 g baking powder and 1 g or less salt is added.

**Durum flour** is made of durum wheat. It has the highest protein content, and it is an important component of nearly all noodles and pastas. It is also commonly used to make Indian flatbreads.

**Semolina** is granulated hard flour prepared from endosperm and available as coarse or fine.

* **Other flours**

**Corn flour** is popular in the Southern and Southwestern US and in Mexico. Coarse whole-grain corn flour is usually called corn meal. Corn meal that has been bleached with dye is called masa harina and is used to make tortillas and tamales in Mexican cooking. Corn flour should never be confused with cornstarch, which is known as "corn flour" in British English.

 **Rye flour** is used to bake the traditional sourdough breads of Germany and Scandinavia. Most rye breads use a mix of rye and wheat flours because rye has a low gluten content. Pumpernickel bread is usually made exclusively of rye, and contains a mixture of rye flour and rye meal.

**Rice flour** is of great importance in Southeast Asian cuisine. Also edible rice paper can be made from it. Most rice flour is made from white rice, thus is essentially a pure starch, but whole-grain brown rice flour is commercially available.

**Chickpea flour** (also known as gram flour or besan) is of great importance in Indian cuisine, and in Italy.

**Potato flour** is obtained by grinding the tubers to a pulp and removing the fibre by water-washings. The dried product consists chiefly of starch, but also contains some protein

**Brown flour**

 Brown flour contains significant amounts of [whole grain](https://en.wikipedia.org/wiki/Whole_grain) [flour](https://en.wikipedia.org/wiki/Flour), usually [wheat](https://en.wikipedia.org/wiki/Wheat). The brown color of whole grain breads is caused by [cerealine](https://en.wikipedia.org/wiki/Cerealine%22%20%5Co%20%22Cerealine). Whole wheat flours that contain raw [wheat germ](https://en.wikipedia.org/wiki/Cereal_germ), instead of toasted germ, have higher levels of [glutathione](https://en.wikipedia.org/wiki/Glutathione), and thus are said to result in lower loaf volumes. Historically, brown meal was what remained after about 90% of the coarse, outer [bran](https://en.wikipedia.org/wiki/Bran) and 74% of pure [endosperm](https://en.wikipedia.org/wiki/Endosperm) or fine flour was removed from the whole grain. Using slightly different extraction numbers, brown meal, representing 20% of the whole grain, was itself composed of about 15% fine bran and 85% white flour. In 1848 it was asserted grain millers knew only of bran and endosperm, but by 1912 it was more widely known that brown meal included the [germ](https://en.wikipedia.org/wiki/Cereal_germ).

**White flour**

White flour is the highest quality of all commercial grades. Bakers often use the term patent flour for white flour, most flours sold today—whether bread, pastry, or cake—are patent flours (white flour). Patent flour is made by combining the first few streams of flour from the milling process. It consists of the innermost part of the endosperm and is essentially free of bran and germ. This makes patent flour lowest in ash and whitest in color. Different grades of patent flours are available, depending on which streams of flour from the milling process are blended. The highest-quality patent flour is called extra short or fancy patent. White flour is more enriched because The milling process involves removing bran and germ from the endosperm. When this is done, vitamins and minerals, dietary fiber, and protein and fat from the bran and germ are removed. It is likely that other important unidentified nutrients are also removed. Flour enrichment replaces certain vitamins and minerals that are lost from milling. It does not replace all the lost nutrients.

**Wheat flour**

**Wheat flour**

is a powder made from the grinding of [wheat](https://en.wikipedia.org/wiki/Wheat) used for human consumption. More wheat flour is produced than any other [flour](https://en.wikipedia.org/wiki/Flour).Wheat varieties are called "soft" or "weak" if [gluten](https://en.wikipedia.org/wiki/Gluten) content is low, and are called "hard" or "strong" if they have high gluten content. Hard flour, or *bread flour*, is high in gluten, with 12% to 14% gluten content, and its dough has elastic toughness that holds its shape well once baked. Soft flour is comparatively low in gluten and thus results in a loaf with a finer, crumbly texture. Soft flour is usually divided into cake flour, which is the lowest in gluten, and pastry flour, which has slightly more gluten than cake flour.

In terms of the parts of the grain (the grass [fruit](https://en.wikipedia.org/wiki/Caryopsis)) used in flour—the [endosperm](https://en.wikipedia.org/wiki/Endosperm) orprotein/starchy part, the [germ](https://en.wikipedia.org/wiki/Cereal_germ) or protein/fat/vitamin-rich part, and the [bran](https://en.wikipedia.org/wiki/Bran) or fiber part—there are three general types of flour. White flour is made from the endosperm only. Brown flour includes some of the grain's [germ](https://en.wikipedia.org/wiki/Cereal_germ) and [bran](https://en.wikipedia.org/wiki/Bran), while [whole grain](https://en.wikipedia.org/wiki/Whole_grain) or *wholemeal flour* is made from the entire grain, including the bran, endosperm, and germ. Germ flour is made from the endosperm and germ, excluding the bran.

**Structure Of Wheat Grain**

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| anatomy of a grain | BRANBran itself consists of six layers, the outer three forming the pericarp and the inner three forming the seed coat. It constitutes about 14% of the total weight of the kernel. It has rich fibre content. This will be removed during the manufacturing process of refined flour. |
| GERMGerm is a small structure from which the sprouting of a new plant begins. It constitutes about 2-3% of the total weight of the kernel and is rich in vitamins, fat etc. |
| ENDOSPERMIt is the major part of a grain which consists of mostly starch and proteins. It constitutes about 83% of the kernel.  |

**Gluten Content of Flour**

**Gluten** (from Latin [*gluten*](https://en.wiktionary.org/wiki/gluten#Latin), "[glue](https://en.wikipedia.org/wiki/Glue)")is a composite of [storage proteins](https://en.wikipedia.org/wiki/Storage_protein) termed [prolamins](https://en.wikipedia.org/wiki/Prolamin%22%20%5Co%20%22Prolamin) an [glutelins](https://en.wikipedia.org/wiki/Glutelin%22%20%5Co%20%22Glutelin) found in [wheat](https://en.wikipedia.org/wiki/Wheat) and related grains, including [barley](https://en.wikipedia.org/wiki/Barley), [rye](https://en.wikipedia.org/wiki/Rye), [oat](https://en.wikipedia.org/wiki/Oat), and all their species Gluten is appreciated for its [visco-elastic](https://en.wikipedia.org/wiki/Viscoelasticity%22%20%5Co%20%22Viscoelasticity) properties. It gives elasticity to [dough](https://en.wikipedia.org/wiki/Dough), helping it [rise](https://en.wikipedia.org/wiki/Leavening_agent) and keeps its shape and often gives the final product a [chewy](https://en.wikipedia.org/wiki/Chewiness) texture. Gluten is a protein complex that accounts for 75 to 85% of the total protein in bread wheat. Gluten is prepared from [flour](https://en.wikipedia.org/wiki/Flour) by kneading the flour under water, agglomerating the gluten into an elastic network, a [dough](https://en.wikipedia.org/wiki/Dough), and then washing out the [starch](https://en.wikipedia.org/wiki/Starch). In home or restaurant cooking, a ball of wheat flour dough is kneaded under water until the starch disperses out

**Types of Cereals**

There are mainly six cereals used for culinary purposes. It includes

* Wheat
* Rice
* Rye
* Barley
* Maize
* Oats
* WHEAT

Wheat is one of the mostly cultivated and consumed cereals. Different varieties of products can be prepared from this cereal, which makes it more versatile among the other cereals. Most wheat is ground into flour, but whole or cracked grains are used in pilafs and salads, and wheat flakes are made into hot cereals or granolas. Wheat contains gluten which makes the dough rise. Wheat with low gluten is used for biscuits and high gluten content for breads. Wheat contains relatively more protein than rice. Wheat is also consumed as breakfast cereal with milk and sugar.

 Classification Wheat

A.**By species**: there are three main commercial species of wheat. They are

1. **Triticum Vulgare**: is the name given to the species that on milling produces a flour particularly suitable for bread and cake production
2. **Triticum Durum**: This produces flour which is suitable for the production of pastas.
3. **Triticum Compactum**: or club wheat produces flour that is not suitable for bread making but ideal for the production of cakes.
4. **As Winter or Spring wheat**: Winter wheat is planted in the autumn and harvested in the early summer in the countries such as Canada, U.S.A, and Russia, where they have severe cold winter and hot, dry summers. This variety of wheat gives a strong flour with high percentage of quality protein

Spring wheat are planted in spring and harvested in the late summer in countries such as U.K and southern parts of U.S.A, where there are mild winters, a fairly high rainfall and rather damp harvesting periods. Spring wheat gives soft flour with low percentage of protein than that of winter wheat.

1. **By the colour of the grain**: colour of the grain refers to the colour of the testa or the fourth skin/layer of the bran. According to this classification grains are classified into
2. White grain: associated with the flours of excellent colours.
3. Red grain: associated with the strength of flour and good blossom.
4. Yellow grain: is associated with the flours that are harsh and have a particular dryness.
5. **By its strength**: strength is determined by the quantity and quality of the gluten forming proteins present. It can be divided into
6. Strong flour comes from winter wheat mainly and are capable of producing good bulky bread type products after a long fermentation period.
7. Medium flours are often mixtures of strong and weak flours and are used to produce goods such as scones, which could not be produced satisfactorily with strong or weak flour.
8. Soft flour comes from spring wheat and is used to produce short paste and sponge type goods.
9. **By its catering use**

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| **Type of flour** | **Catering use** |
| Weak flour | Short paste, sponge goods |
| Medium flour | Slab cakes, scones |
| Strong flour | Bread, rolls, puff pastry, thickening soups and sauces |
| Brown flour | Brown bread, rolls, scones |
| Semolina | All varieties of pasta, semolina pudding |
| Processed grain | Breakfast cereals, eg: puffed wheat |
| White flour | Patent grade | Maybe used on its own or mixed with other flours for bread and cake |
|  | Bakers grade | Mainly used for bread making |
|  | Straight run | General purpose flour |
|  | Self-raising | General purpose flour with an addition of low percentage of baking powder in it |
|  | High ratio | Special cake flour for making very light cakes such as angel cakes  |
|  | High protein | For production of high ratio fruit cakes |

1. **By the parts of the grain used**: the grain consists of three parts, namely Endosperm, Bran and Germ; each of which can be separated from each other. Flour can be obtained as whole grain flour, germ flour and refined flour

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| Whole grain flour | All parts of the grains are used |
| Germ flour | Germ and endosperm is used, bran will be removed  |
| Refined flour | Only endosperm is used, otherwise called as white flour |

1. **By the country where it was grown**
* **OATS**

Processed into rolled oats and ground oats meal. It contains good protein and fat content. Ground oats meal is available in three grades- coarse, pinhead and fine. Rolled oats are turned into flakes and used for making of porridge

**STORAGE:** it should be kept in containers with tight fitting lids and stored in a cool well ventilated place.

* **RYE**

It is a prominent cereal in many parts of Russia and Europe. It has low protein content. Main use is for manufacturing rye bread.

* **BARLEY**

It is a hard cereal, not processed into flour due to lesser protein content. Malt products, pearl barley, scotch or pot barley is its products

* **MALT**: made by allowing barley grain to sprout changing much of the starch to sugar (maltose). The germinated grains are milled and floured into malt flour.
* **PEARL BARLEY**: which is the polished endosperm, after bran and germ has been removed. Used in soups and stews
* **SCOTCH OR POT BARLEY**: cleaned whole grain with only outer husk removed.
	+ **MAIZE**

It is also known as corn, sweet corn or corn on the cob. It contains starch and carbo hydrates. Processed into corn flour and flakes. It also yields good oil suitable for cooking.

* **RICE**

It is the most cultivated cereal apart from wheat. Two factors determine the rice available

1. Size and shape of grain: Three main types of rice mainly used are as follows
2. Long grain rice:
3. Medium grain
4. Short grain
5. The type of process that grain undergo: this may include
6. Regular milled
7. Parboiled
8. Pre-cooked or instant rice

**CATERING USES OF CEREAL PRODUCTS**

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| **CEREAL** | **PRODUCT** | **CATERING USES** |
| **WHEAT** | Weak flour | Short paste, sponge |
| Medium flour | Slab cakes, scones, aerated buns, Madeira cake |
| Strong flour | Bread rolls, puff pastry, thickening soups and sauces |
| Brown flour | Brown bread, rolls, scones |
| White flour | Patent grade-may be used on its own or mixed with other flours for bread and cake making |
| Bakers grade- the main grade for bread making |
| Straight run – a general purpose flour |
| Self-raising: general flour with an addition of baking powder  |
| High ratio- special type of flour for making light cake |
| High protein- for production of high ratio fruit cake  |
| Semolina | All varieties of pastas and semolina pudding |
| Processed grain | All breakfast cereals |
| **BARLEY** | Malt | Malt flour for bread, malt extract for brewing |
| Pearl barley | Soups and stews |
| Scotch barley | Stews, beverages |
| **MAIZE** | Corn flour | Thickening agent |
| Maize endosperm  | Used for breakfast cereals |
| **OATS** | Rolled oats | Porridge |
| Ground oat meal | Oat cake, ginger cake |
| Oat flour | Alternative to wheat flour |
| **RYE** | Flour | Rye bread |
| **RICE** | Grain | Short grain – rice based sweet dishes |
| Medium grain – rice based sweets and savory dishes |
| Long grain – savory rice dishes |
| Flour | Thickening for soups and sauces, special cakes and macaroons |
| Cones | Mainly used for dusting bakery items during production |
| Paper | Base for macaroons and sweets |