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Milling process for local cereal varieties

Milling is a process by which cereals are crushed and reduced to particles of various sizes, allowing flour or bran to be obtained.
The quality of the flour is determined by the type of cereal and by the mode of processing subsequent to harvesting.

Preparation of cereal grains

Before milling, it is necessary to store grains properly. This process consists in drying or remoistening the grain to a humidity level of 15-17%.
This step improves the technical aspects of the milling process, as these conditions make the bran more elastic and the endosperm more brittle, qualities which in turn reduce the energy requirements for performing the milling.
This process requires certain rest periods (from 6 to 24 hours) in order for water to be properly distributed within the grains. These preparatory phases and times vary according to cereal varieties, temperatures and the initial percentage of humidity in the grains.

Milling and types of mills

Two main categories of mills are used for milling cereal grains:

Millstone gristmills :

This type of mill is formed of two large millstones, with the upper one fixed and the lower one mobile. Grains pass through both stones and are crushed.
The grains thus crushed are sifted to separate the bran from the endosperm and the germ.
In addition to the type of the millstones used, the calibration of the distance between them is a key factor in obtaining optimal results

Roller mills :

This type of mill is made up of various pairs of steel cylinders, grooved or smooth, which rotate in opposite directions at different speeds. Grooved cylinders, which crush the grains, alternate with smooth ones, which compress them.
Various factors determine the intensity of the milling during each phase: the form of the groove, the number of passages, the length of time, the gradation and the difference in rotation speeds. Different combinations of these factors produce flours with a greater or lesser content of bran and germ.

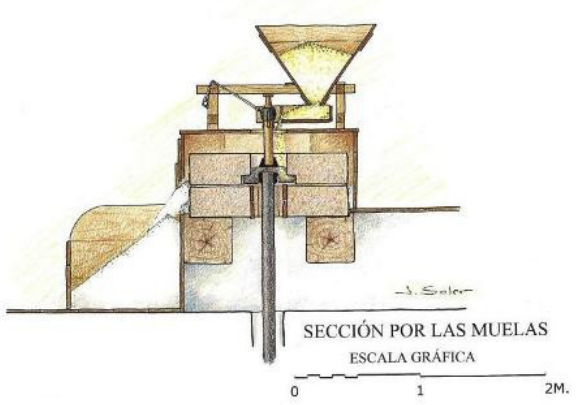

Figure 1. Drawing of a millstone gristmill. Source: Jorge Miguel Soler Valencia at http://patrimonioindustrialensegovia.blogspot.com/search/label/muela

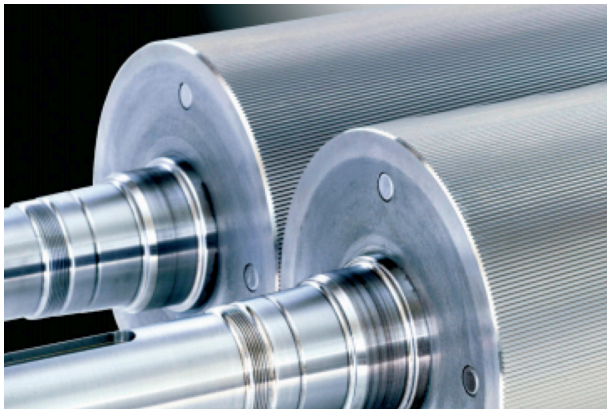

Figure 2. Detail of grooved cylinders. Source: https://www.buhlergroup.com/europe/es/downloads/Roll-Service-for-Roller-Mills_en.pdf

Artisanal milling vs. factory-produced flour

Industrialization brought in its wake greater mechanization of artisanal milling processes, giving rise to the expansion of flour factories employing the Austro-Hungarian system of roller mills, to the detriment of traditional village mills.
The use of the roller mill would be adopted by the large industrial producers; even so, depending on the number of passages and the processing time, flours can be obtained which are similar to ones obtained from stone milling.
It should be emphasized that the key aspect of artisanal processing is that the entire grain is milled, without separating the germ and the bran: the result is flour with a richer taste and greater nutritional substances.
Usually industrially produced flours do not contain germ, as this element oxidizes relatively quickly, turning the flour rancid and making conservation impossible for long periods. By contrast, artisanal bread makers appreciate this type of flour: because it is fresh, it has superior organoleptic and nutraceutical properties compared to flour that has been stored for some time after it is milled.

Products obtained from milling: quality, types of flour, advantages and disadvantages

Milling of grains produces bran (the external layer of the larger grains), semolina (made up of medium-sized particles) and finally flour (the finest particles of milled grain).
Classification of flours varies from country to country. Usually they are grouped according to:
- extraction rate: the quantity of flour obtained from grains. Whole wheat flour has a rate of 100%, while flour suitable for bread making has a rate of 70%;
- the strength of the flour: this measure concerns the quantity and quality of proteins (gluten). Flours with are classified as weak (containing little gluten) or strong. This measurement is indicated as "W".

Extraction rate and strength are independent measures

	Spain (by strength)	Italy	France, Portugal	Germany	Used to make
Weak, or for baked goods	from W80 to 100	00	T45	405	Sponge cake, muffins, cookies
For bread	from W100 to 170	0	T55	550	Normal bread, pizza
Medium strength	from W180 to 250	1	T80	812	Puff pastry
Strong	W>250	2	T110	1050	Pastries or bread made with butter, eggs, etc.

Table 1. Classification of flours in different European countries.
Source: https://lacocinadefrabisa.lavozdegalicia.es/clases-harina/

Evolution of the flour industry in the EU

In the EU, the number of mills is decreasing, as smaller producers are being swallowed up by large industrial manufacturers. To slow down this tendency, it is necessary to distinguish between different products and encourage vertical integration (both with regard to the primary sector and the secondary food processing industry). Some of the most common collaborative initiatives of this kind are to be found between the production of cereals and their milling, or between artisanal milling and processing, whether in the sectors of beer, bread or pasta.

Recommended reading

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