Pasta Drying

Pasta in general

Pasta is a type of noodle and is a staple ingredient of traditional Italian cuisine, with the first reference dating to 1154. The word "Pasta" is commonly used to refer to the variety of pasta dishes. Typically pasta is made from unleavened dough of durum wheat flour mixed with water and formed into sheets or various shapes. It is then cooked and served in any number of dishes. Pasta can be made with flour from other cereals or grains, and eggs may be used instead of water. Pastas may be divided into two broad categories, dried *(pasta secca)* and fresh *(pasta fresca)*.

Since the 1600s pasta manufacturers established themselves across the coast of San Remo. The extrusion press produced large amounts of uniform pastas. The consistency of shapes and texture of the pasta manufactured by the extrusion press was believed to be superior to handmade pasta. This technology had spread to other areas including Genoa, Apulia, Brindisi, Bari, and Tuscany. By 1867, the Buitoni Company, in upper Tiber Valley, became one of the most successful and well-known pasta manufacturers in the world.

In the modern world of the 21st century, most dried pasta is commercially produced via an extrusion process. Fresh pasta was traditionally produced by hand, sometimes with the aid of simple machines, but today many varieties of fresh pasta are commercially produced by large scale machines with the products broadly available in supermarkets throughout the world

Dried pasta

Dried pasta may also be defined as "factory-made" pasta because it is usually produced in large amounts with large machines. Dried pasta is able to be shipped over long distances and has a longer shelf life compared to fresh pasta. The recipe for the ingredients required to make dried pasta include semolina flour and water. Eggs can be added for flavor and richness, but are not needed. In contrast to fresh pasta, dried pasta is dried at a low temperature for several days to remove all moisture from the raw product allowing it to be stored for a longer period.

As it is cooked, dried pasta will

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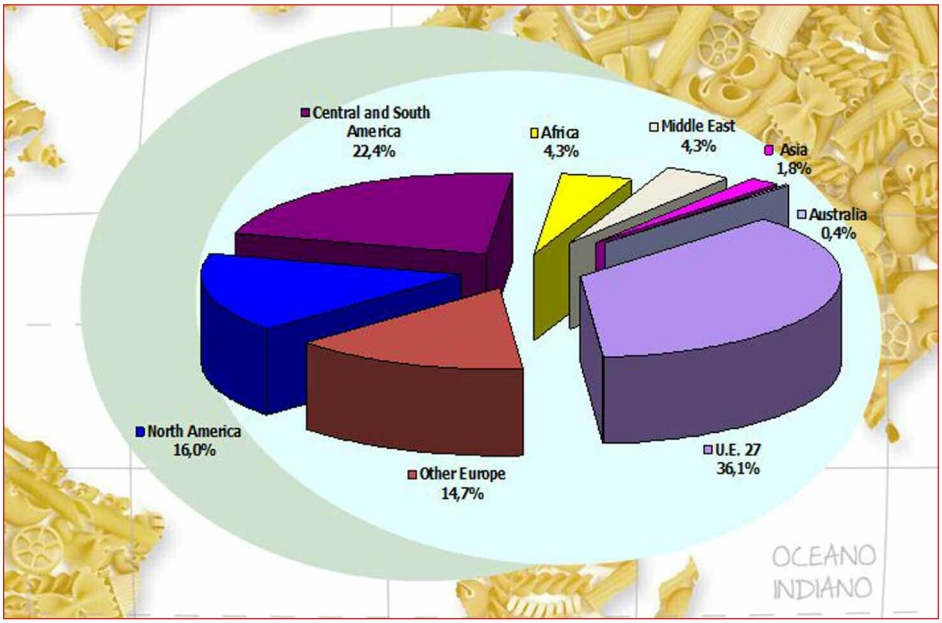
WORLD PASTA PRODUCTION



From UN AFPA http://www.pasta-unafpa.org

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Dried Pasta

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usually double in size as it re-absorbs the water that was originally removed in the production process. Good quality dried pasta is identified by its slight rough surface and compact body that helps maintain its firmness in cooking.

The great advantage of dry pasta

In normal ambient conditions, dried pasta can be stored a long time without the need for preservatives or particular storage environmental requirements. Moisture and insects are the main concerns during storage time. Good packaging and suitable storage conditions are sufficient to ward of these dangers. The essential prerequisite is for the pasta not only to be dry, but also to have been dried properly!

Facts & Figures

According to the US AFPA, The largest producers of pasta are:

1. Italy	3,326,750 tons
2. US	2,000,000 tons
3. Brazil	1,191,847 tons
4. Russia	1,083,000 tons
5. Turkey	851,830 tons

The largest annual per capita consumers of pasta are:

1. Italy	56 lbs/person
2. Venezuela	29 lbs/person
3. Tunisia	26 lbs/person
4. Greece	25 lbs/person
5. Switzerland	20 lbs/person
6. Sweden	20 lbs/person
7. US	19 lbs/person
8. Iran	19 lbs/person
9. Chile	19 lbs/person
10. Peru	18 lbs/person

In 2013, there were 173 firms in the world producing about 4.6 million tons of pasta.

Pasta dryers are modular designed and contain 4 to 10 climate zones.

Why the need to measure humidity?

After processing the dough, pasta normally has a moisture content of approximately 30% (depending on the type of dough and the shape). It is considered dry when its internal moisture content is equal to or less than 12.5%. In addition to being dry, the pasta must be "stable". In other words, within certain environmental limits (air temperature and humidity) the remaining moisture content must remain uniform.

Pasta dough starts with a moisture content of approximately 30% where it is in a "plastic state". A material in a plastic state can deform under the action of external forces without any particular tension forming inside it and it can permanently keep the shape acquired as a result of these forces.

As the pasta begins the drying process, its moisture content falls further to a range of 22-18%. The state of the pasta changes from plastic to elastic.

In this new state the product behaves in a totally different way. An elastic body subjected to stress deforms, but tends to recover its original shape as soon as the stress stops. Besides causing deformation, stresses can then bring about tension inside the product. If the tension comes within the product's specific limit of elasticity, it can be absorbed precisely by its own elasticity. If the stress exceeds this limit the product will inevitably be damaged.

The laws governing the phenomenon of these physical states (plastic and elastic) must therefore be applied for all drying operations. In summary, drying pasta means modulating and appropriately controlling the evaporation of water from the product using heat and ventilation.

In drying pasta, ventilation plays a fundamental role as it serves the dual purpose of removing the water given off by the product due to evaporation and as a vehicle to convey heat. The heat energy conveyed by the ventilation air is used to heat the product and the water it contains causing active evaporation. Knowing the volume of air required for a certain phase of the drying process and controlling its intensity and flow is an essential condition for proper drying of the pasta.