

First pasta post

The ongoing search for full traceability and consistency of quality, colour and cost

by Andrew Wilkinson, Milling and Grain

By virtue of its various international incarnations, pasta is counted amongst the world's most popular food staples. From 'mein' in China, to 'pierogi' in Poland, almost every country has its own version of the high carb creation.

But why is it so popular? Well, the popularity of pasta can be attributed to several aspects, with the chief amongst these being that it is incredibly easy to manufacture, store and then prepare. In a time when cost and convenience continue to be king, pasta's reign looks set to be a long one.

So how did the pasta story begin? Believe it or not it is traceable right back to 900 BC, when Ancient Etruscan meals of gruel and porridge were replaced with more appetising unleavened bread

cakes. And it is these cakes that food historians believe may have been the precursor to pasta.

A more widely accepted myth is that the Italian explorer Marco Polo brought the noodle back to Italy from his travels in the Orient during the 1300s. However, some contend that a close examination of Polo's papers reveals that he reported enjoying a certain type of noodle in China, comparing it favourably to the pasta he was accustomed to eating in Italy – so we'll leave this one to you to decide.

That said, it wasn't until as late as the early 15th century that the first industrial production of pasta occurred in Naples, Italy. This location was chosen for its naturally fluctuating temperatures, sometimes as much as four times a day, which provided the hot and cold temperatures necessary for drying, with mechanical drying not invented until 1800.

High quality raw material

When pasta is made the incoming wheat is weighed, sampled and analysed, passed through a preliminary cleaner and magnet, then stored according to grade.

Cleaners then remove weed seeds, dirt and other extraneous material through machines which separate by size, specific gravity and shape. Frictional cleaning equipment, or scourers, scour the surface of the kernel, removing the outermost layers of the bran.

The next step is tempering the grains. During tempering, water is added to toughen the outer bran coats for easier separation from the endosperm. Tempering also mellows the endosperm for grinding.



Traditionally, durum wheat is tempered for a relatively short time. However, new technology in pasta manufacturing now enables finer semolina to be used, allowing for longer tempering periods.

Once the chosen flour has been selected, the mixture is then kneaded by an auger extruder equipped with mixing paddles and kneading blades to obtain a homogeneous mass, and after that is extruded through various shaped dies.

Mixing

In the mixing stage the wheat semolina and water are combined by a ratio of 3:1. It is of critical importance that water used is suitable for drinking, with no off-flavour or contaminants, with an ideal temperature of about 35-45°C to help speed up absorption.

Adding egg can also improve the nutritional quality and richness of the pasta, whilst disodium phosphate can also be added to reduce the cooking time.

Mixing the semolina and water takes place in two stages. First, the ingredients are measured and added to a pre-mixer, and then they are transferred to a mixing chamber which finalises the mixing process and produces a homogeneous mass.

Semolina dosing is done by two methods: volumetric feed (by volume), and gravimetric feed (by weight). In volumetric feed, a specific volume of semolina is measured by variable speed screws or rotary air-lock valves.

But is semolina the best type of flour that pasta can be made from? Well according to Marco Galli, Chief Technologist at Ocrim, this depends on how the pasta will be, manufactured, stored and prepared.

When it comes to making dough for pasta, the flour used can either be bread wheat with a high protein content, or if this is not



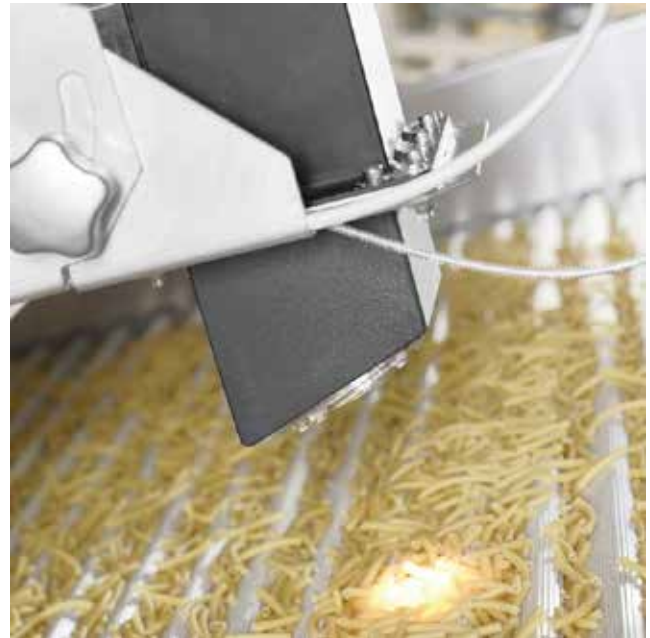
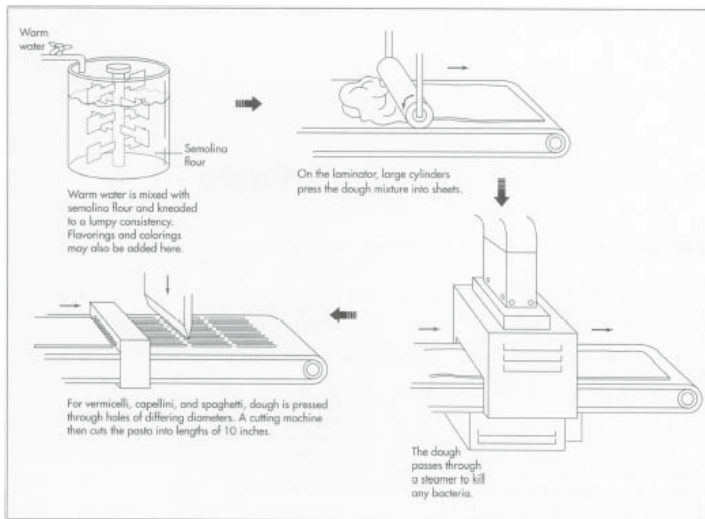
available then durum wheat can be used, with the protein content supplemented with the addition of semolina.

The latter of the two is used to produce dried pasta that is manufactured using industrial machines, with the semolina added to the flour to give the pasta the required consistency. Fresh pasta is typically made using white/durum flour which is also known as hard wheat or bread wheat and includes such strains as Red Spring and Red Winter.

What are the most obvious differences between the two types of flour? Well durum wheat is harder than bread wheat, it's not surprising then that durum is Latin for the word "hard".

Therefore, more thorough grinding is required to produce flour, which damages some of its starch content. This makes durum wheat flour less suitable for making bread, which goes some way to explaining the differentiation.

Durum wheat, which includes such strains as Amber Durum is required when producing semolina flour when making pasta, with the re-grounded semolina flour being a popular bi-product that is used when producing dough for pizza, focaccia and other leavened products.



Mr Galli also states that the flour that is widely used to make pasta in Italy is, 'Double Zero', adding that this is a code that is identified by law to give some information about the flour. Double Zero satisfies the nine percent minimum protein requirement.

To make pasta properly the flour must have at least 12 percent protein content to guarantee true al dente, although we can mix in semolina to give the pasta dough the proper content, with the only really noticeable difference being the ash content.

The other key point is that the pasta flour must be clean, which is why ensuring that the ash content is kept low is very important. In pasta dough the yellowness is something that is widely recognised as a characteristic of a good quality product.

Making high-quality pasta available worldwide

As durum wheat is no longer the only raw material used to make pasta, those producing machinery for pasta production are now having to adapt in order to accommodate other commonly used ingredients including soft wheat, buckwheat, teff, corn and rice.

In fact, the growth of their use as a raw material in the production of pasta is now twice that of common wheat.

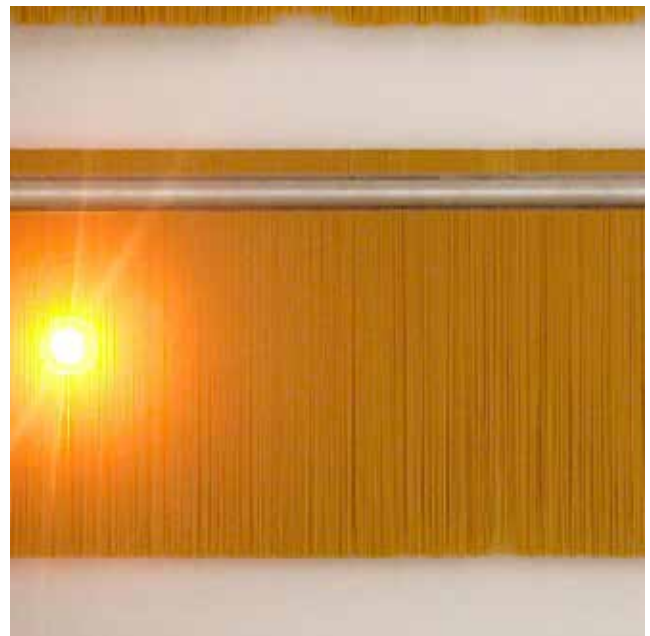
This is part due to the technology developed by companies such as GEA Pavan which is allowing countries that you wouldn't automatically associate with pasta production to manufacture their own product, enabling them to satisfy demand in their own markets.

When processed correctly, even low-gluten flour can be used to create high-quality products. By applying technologies such as drying in different climatic zones and vacuum, excellent end products can be obtained even from flours with low protein content. Another company that is bringing the pasta manufacturing industry up to date is Bühler.

PastaSense from Bühler

Described as being a quality monitoring system that continually records raw material and pasta characteristics in-line along the entire production process, PastaSense monitors all relevant characteristics with impact on product quality, such as protein, ash, moisture, dark spots and colour of the raw material, as well as the moisture and colour of the pasta.

The monitoring system automatically measures the main parameters such as colour, protein, ash and moisture content, so product quality is always under control every three seconds. When compared to infrequent, manual sampling, this allows for quicker detection of quality deviations.



It also features a digital dashboard, which visualises historic and current quality parameters. This is achieved by comparing different production lines and time periods for benchmarking and performance optimisations.

The report function easily summarises all measured characteristics from each production lot. Thus, traceability is enhanced and decisions about product releases can be taken in very little time.

Sensors can also be positioned at the raw material feeding, as well as along the entire drying process; from pre-drying to drying, before it reaches stabilisation and cooling, allowing full traceability throughout the production process.

Ensuring supply chain traceability

As suppliers are solely responsible for the end product, traceability is incredibly important for a number of reasons. Traceability has three key benefits; it increases supply chain visibility, improves quality control systems and reduces risk. By keeping a record of the entire production and distribution history, suppliers are able to react quickly to any issues.

One way of ensuring full traceability is to enlist the services of a company that manages every stage of the process. Described as being a key element in the range of

services offered by Ocrim, Axor Ocrim is able to show its customers every stage of the process, right from cultivation and processing of raw materials, to the creation of the final product.

Through advanced technology and experience, the company takes every care to manage raw materials from the earliest stages of production by gathering knowledge of the cereal, crops and its processing - right up to its transformation of the final product into products such as pasta, bread and bakery products in general.

In 2012 the collaboration between the various companies in the Ocrim family lead to the creation of a full training service within a research centre. Featuring a working mill, fields conceived as open spaces for precision agriculture and a campus serving for accommodation purposes, the facility deals with all aspects of the supply chain.

The centre therefore provides for training from any point of view: from knowledge of seeds to the production and marketing of finished products.

Staying competitive

As the pasta production industry continues to become more reliant on technology, the push towards full automation and industry 4.0 appears to be gaining pace. With the larger companies now able to produce large volumes of product at an increasingly low cost per unit, the pressure is now on smaller firms to either keep up or switch direction.

So, in order to avoid the ramifications that come with being left behind, like in any manufacturing industry, producers may want to seek out their own niche, as the gulf in yield capacity will only get bigger.



However, they will still need to achieve the pasta production gold standards of full traceability and consistency of quality, cost and yield, if they are going to remain competitive in these markets too.