Fresh pasta is dried only superficially, or not at all, during the production process.

Both types are sometimes treated with hot water or steam (before drying; see chapter on Instant Noodles).

Certain requirements and conditions have to be fulfilled in the production of pasta as in any other food production process. They fall into the following general categories:

- Raw materials
- Method
- Plant and equipment
- Know-how.

The raw materials are the basic requirement for production; they largely determine the method and equipment to be used and therefore make specific demands on the knowledge, experience and skill of the persons who handle them.

The method and the technical equipment are two aspects of the same question: on the one hand thought must be given to the raw materials to be incorporated in the product and a suitable method chosen; and on the other hand special knowledge is needed to develop and specify the technical equipment for making these raw materials up into the product.

Since the production of pasta is a highly mechanized process, the quality of the finished product depends to a great extent on the manufacturer's know-how and his ability to control the process correctly.

Out of this complex of questions we shall consider those that have to do with the raw materials and are relevant to the quality of the end product and any faults that may occur.
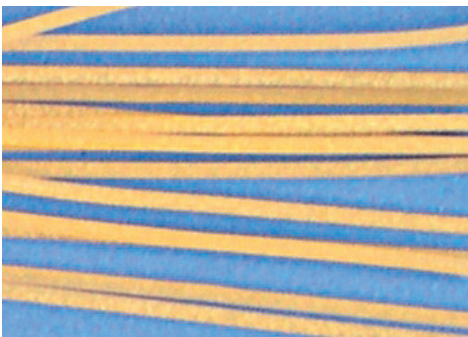
23.3 Faults in Pasta: Their Causes, and Ways of Preventing Them[44]

V. Webers and G. Schramm

Dry pasta or noodles are products of any shape made from cereal flour with or without the addition of egg and/or other ingredients by dough formation, shaping and drying without a fermentation or baking process.

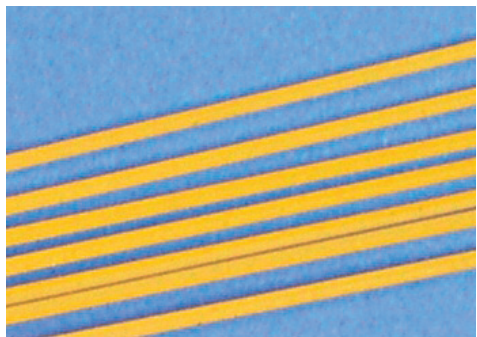[44] *Photographs by Mühlenchemie GmbH*

Fig. 216: Comparison of spaghetti made from bread flour (left) and durum wheat (right)
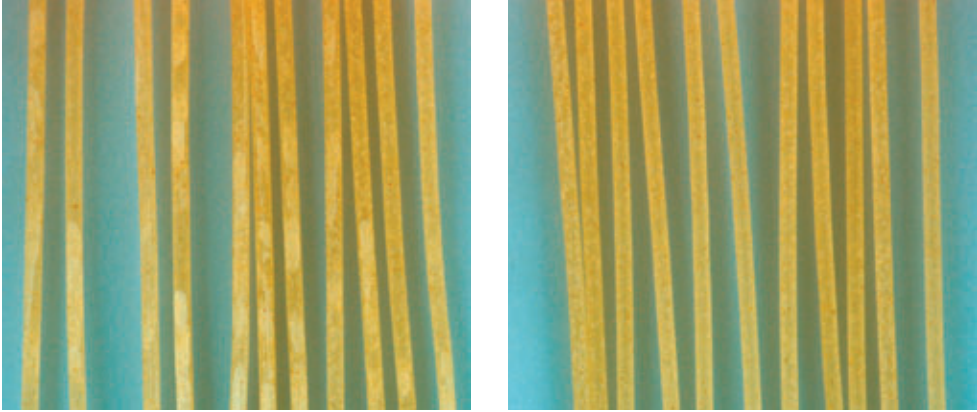
Fig. 217: Cracks in spaghetti made from soft wheat (left) caused by drying too quickly. On the right,
slowly-dried pasta by way of comparison.

Tab. 132   and Tab. 133 show the negative effects of raw materials and processing on the properties of the boiled pasta, and possible ways of preventing them.
Tab. 134   summarizes faults in the cooked pasta in respect of taste and smell.

Tab. 132: Causes of faults in the finished pasta and ways of preventing them:
appearance and shape of the pasta before cooking

Faults	Possible causes	Counter-measures
Pale, white	Inclusion of soft wheat Flouriness of the durum wheat (not vitreous enough) Insufficient yellow pigment in the semolina High lipoxygenase activity of the semolina Rough surface of the shaping dies Dough not moist enough	Ensure that only one variety is used Proper selection of raw materials Proper selection of raw materials Proper selection of raw materials High drying temperatures Faster production cycle Teflon coating, special surface coating of the dies Optimize dough moisture
Milky	Raw material not vitreous enough Inclusion of soft wheat or other foreign cereals Bubbles in the dough	Proper selection of raw materials Proper selection of raw materials Optimize the vacuum (mixer/extruder)
Brown	Natural colour of protein + polyphenyl oxidase	Proper selection of raw materials
Reddish	Maillard reaction at high drying temperatures	Optimize drying method
Stripes, spots	Dough not moist enough Drying method	Optimize dough moisture Optimize drying method (lower temperature, longer drying time)

White specks	Flouriness of the durum semolina
	Uneven wetting
	      Semolina yield too high
	      Grain-size spectrum too wide
	Inclusion of soft wheat
	Dough not moist enough
	Air bubbles in dough
		Choose a suitable variety
		Optimize milling diagram
		
		Ensure that only one variety is used
		Optimize dough moisture
		Optimize vacuum (mixer/extruder)

Brown specks	Pieces of husk or germ	Optimize milling diagram; check sieves
Black specks	Cereal infected with fungus	Complain to the supplier
Cracks, fractures, broken pieces	Percentage and quality of the protein in the raw material Unsuitable drying conditions Unsuitable cooling conditions up to packaging / storage (climate shock)	Proper selection of raw materials Optimize the drying method (temperature, time, humidity) Optimize the cooling conditions (temperature, time, humidity)

In spite of considerable successes in the breeding and selection of soft and hard wheat *Triticum aestivum* and technical progress in pasta production, the raw material of choice for making high-quality dried noodles is still durum wheat *T. durum*.

No other cereal has the entire complex of raw material attributes offered by durum wheat.

But with durum wheat, too, the quality that can be achieved in the finished product depends on selection of the raw materials, proper treatment at the mill and the production process.

The photographs show some typical shortcomings in the quality of extruded pasta: a dark, unattractive colour resulting from the use of poor-quality soft wheat flours (Fig. 216), cracks resulting from harsh drying conditions (Fig. 217); and blisters caused by the inclusion of air bubbles as a result of an inadequate vacuum in the mixer (Fig. 218). Tab. 132 shows the negative effects of raw materials

and processing on the properties of dried pasta, and possible ways of preventing them. As we said before, important as it is to ensure high-quality raw materials, this is not the only factor on which the production of good pasta depends. Raw materials, shaping dies, plant, technology and qualified operating personnel interact in a complex manner and result in an end product that is excellent or less satisfactory.

Fig. 218: Blisters in soft-wheat spaghetti caused by an inadequate vacuum during mixing.

Tab. 133: Causes of faults in the finished pasta and ways of preventing them: cooking quality

Faults	Possible causes	Counter-measures
Slimy surface; does not keep its shape; high cooking loss	Gluten network inadequately formed or too weak, with the result that the starch grains are not sufficiently coated and lie exposed on the surface; they are washed out during cooking and precipitate as a sediment in the cooking water	Proper selection of raw materials; optimize the parameters for dough preparation and extrusion; stabilize the gluten network by technical means (e.g. high-temperature drying) or by using additives, taking the food laws into account
Sticky surface	Rough surfaces of the shaping dies (the gluten network tears at the surface, causing starch to escape) Wrong cooking method	Suitable surface coating of the shaping dies Place pasta in boiling salted water (1:10), boil strongly, determine the finishing point

Tab. 134: Causes of faults in the finished pasta and ways of preventing them: sensory quality

Faults	Possible causes	Counter-measures
Uneven texture	Gluten network inadequately formed or too weak because of unsuitable cooking method; finishing point incorrectly determined	Proper selection of raw materials; stabilize the gluten network (see above); place pasta in boiling salted water (1:10), boil strongly, determine the finishing point
Texture too hard and inelastic	Undercooked Too little water used in preparing and extruding the dough Unsuitable drying	Optimize the cooking method Optimize the conditions for preparing and extruding the dough Optimize the drying method
Texture too soft	Overcooked Poor quality raw materials	Optimize the cooking method Proper selection of raw materials; optimize the stabilizing methods (see above)
Unpleasant taste or smell	Quality of the raw materials Raw materials inadequately cleaned Improper storage (odour taken on from other goods) Unsuitable stabilizing measures (additives)	Proper selection of raw materials Complain about the raw materials Ensure suitable transportation and storage at the pasta factory If additives are used, ensure that the concentration is acceptable from the sensory point of view

Tab. 135 lists desirable properties of flour as raw material for pasta and noodles.

Tab. 135: Recommended attributes of raw materials as a condition for producing good-quality pasta

Attributes		Durum wheat semolina	Soft wheat flour
Appearance		Clean, pure	Clean, pure
Colour		Yellowish tinge	Light, white, with slight yellow tinge
Specks		Very few	Very few
Moisture	%	≤ 15	≤ 15
Protein (in solids)	%	≥ 13.5	≥ 12.0
Wet gluten	%	≥ 28	≥ 25
Gluten Index		≥ 70	≥ 70
Gluten properties		Elastic, not short	Elastic, not short
Falling Number	s	≥ 300	≥ 300
Minerals (d.m.)	%	≤ 1.0	≤ 0.6
Granulation		Narrow granulation range with small proportion of very fine or coarse grains (200 - 500 µm)	Granular flour (semolina) or middlings, with a large percentage at 160 - 315 µm