



NIGERIA'S PASSION FOR PASTA

by Martina Mollenhauer

African country's milling industry has made massive investments in pasta production facilities

Pasta is one of Nigeria's most important and popular staple foods. The greater part of the Nigerian milling industry has long since recognized this trend and operates pasta factories of its own. Not only durum wheat is used in pasta production; it is often mixed with flour made from hard or soft wheat. But in order to make pasta in authentic "al dente" quality, processing equipment, recipes and flour treatment have to be optimally adjusted to each other.

The market intelligence service "Euromonitor International" forecasts an annual growth rate of about 4% for the Nigerian pasta market. Although spaghetti, macaroni, etc., are now having to face stiff competition from Asian instant noodles, which are quicker to prepare and cheaper, no Nigerian household would want to do without traditional pasta.

In order to cover this lucrative segment, the Nigerian milling industry has made massive investments in pasta production facilities of its own in recent years. Nearly every mill now produces pasta itself. But the prosperous market is fiercely contested, with harsh competition between the different firms.

Manufacturers who hope to position themselves successfully

In the photo above, the left dish of pasta was made from 100% durum, the center dish was made with 40% durum, 60% hard wheat semolina and 300 ppm of Pastazym, and the right dish was made using 20% durum, 80% hard wheat semolina and 300 ppm of Pastazym. Photo courtesy of Mühlenchemie.

in the long term have to reconcile quality with economy. A key factor in this context is the quality of the flour or semolina used in pasta production. In principle, durum wheat with its high percentage of protein and low starch content and its positive gluten properties is the raw material of choice for making perfect "pasta italiana." Triticum durum gives the noodles a firm bite, a brilliant yellow color and excellent cooking tolerance.

But for reasons of economy or availability, many countries including Nigeria use hard and soft wheat as well as durum. Mills that wish to produce the best possible results with these raw materials can choose from a range of special flour improvers based chiefly on enzymes. When xylanases or lipases with highly specific effects are adjusted precisely to the particular application, they are an excellent way of boosting the performance of low-protein flour mixtures. Further ingredients like

emulsifiers, vital wheat gluten, ascorbic acid or colorants can be added to round off the effects of the flour improvers, depending on the requirements.

PILOT PLANT FOR PASTA

For many years Mühlenchemie has developed enzyme compounds for the pasta industry. It has recently enlarged its applications research facilities to include a pilot plant for pasta in order to close the gap between its knowledge of raw materials and actual process technology. The pilot plant makes it possible to take the pasta manufacturer's industrial production process into account when developing customized raw material strategies.

Several of the company's current projects are directed toward replacing the largest possible percentage of durum wheat with hard wheat, while maintaining product quality. With an enzyme compound from the Pastazym

Plus series, Mühlenchemie succeeded in producing spaghetti that had attributes identical to those of the 100% durum model in respect of color, bite and cooking properties. It is possible to replace 30% to 50% durum with 50% to 70% hard wheat, depending on the raw material base.

Another regular topic of research projects at Mühlenchemie is composite flour. In Nigeria, there is discussion of using cassava flour in food production. In this connection, trials with a flour mixture containing 5% or 20% cassava flour, respectively, were carried out in the pasta laboratory. Cassava flour is really starch that contains no gluten. This reduces the gluten content of the mixture, with the result that it becomes sticky. Here, too, the quality and color of the noodles were greatly improved when the flours were treated with selected compounds from the Pastazym or EMCEDur range.

The durum problem is certain to become worse in the coming months, because the 2014-15 harvest is predicted to be the smallest for over 10 years. Mills around the globe will be faced with the need to resort to raw materials that are more readily available or cheaper. Any resulting deficits in product quality can only be made up for by optimal adjustment of the recipe to the processing equipment. The following is a brief overview of the most common faults in pasta production and possible ways of preventing them.

Problem: Cracks in the dried product, broken pieces.

Possible cause: Low protein content, weak gluten quality, faulty drying.

Solution: Adjust the drying process (time, temperature, humidity); optimize the cooling phase. Improve the cross-linking of the starch and protein fractions through suitable flour treatment,



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thus increasing the resistance of the dried products to mechanical stress.

Problem: Weak yellow color.

Possible cause: Proportion of durum semolina too small, or of poor quality.

Solution: Supplement with colorants or vitamins to achieve a rich yellow color. Products available for this include curcumin, beta-carotene, tartrazine, riboflavin and folic acid. The individual choice will depend on the specific food laws and the requirements of the application.

Problem: Specks in the dried noodles.

Possible cause: The shell content of the flour/semolina is too high (for example, because of a broken screen or incorrect conditioning of the grinding process).

Solution: Adjust the grinding process; reduce the ash content.

Problem: Greyness, or lighter color due to fortification with iron.

Possible cause: In many countries, flour is fortified with micronutrients. The

main constituent of these is usually the trace element iron, which is available in the form of several different chemical compounds. Recent research by Mühlenchemie has shown that in some cases ferrous sulphate may result in greyish discoloration, while sodium iron EDTA and ferrous fumarate sometimes have an undesirable lightening effect.

Solution: If necessary, choose an alternative iron compound, e.g. ferric pyrophosphate, ferric orthophosphate or electrolytic iron. Observe food regulations.

Problem: Lack of bite, high stickiness.

Possible cause: Use of hard/soft wheat (*Tricum aestivum*) with low gluten, elastic gluten; insufficient mixing.

Solution: Optimize the parameters for mixing and extrusion (time, temperature, added water). Strengthen the protein network with the aid of suitable flour improvers (enzymes, vital wheat gluten, emulsifiers etc.), thus consider-

ably improving the performance of the flour and enhancing the texture and sensory properties of the cooked pasta.

Problem: Insufficient cooking tolerance, high cooking loss, cloudy cooking water.

Possible cause: Weak dough structure, exudation of starch during cooking.

Solution: Increase cooking tolerance with enzyme compounds (e.g. xylanases, lipases) in order to reduce denaturation of the gluten and the exudation of starch during cooking. Specific flour treatment can prevent intensive swelling of the starch grains even with extremely long cooking times. **WG**

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