



GERMAN RYE BREAD

Germany's mills and bakeries are inconceivable without rye flour. German consumers love their dark, rustic rye loaves that contain 50% to 100% rye flour, depending on the type. But the quality of these flours has changed noticeably in recent years. The low enzyme content, especially, can cause problems with acidified doughs. The remedy lies in specific adjustment of the dough preparation method and suitable flour treatment.

RYE LOAVES: TRADEMARK OF GERMAN BAKERIES

Rustic rye loaves are the calling cards of every German bakery. The appearance and flavor of the baker's own personal range of products reflect his or her skill and creativity as an artisan. And German consumers greatly appreciate this know-how. Instead of light-colored wheat loaves, they prefer strongly baked, darker varieties with extra-fine, coarse or whole-grain rye flour. Many types have a slightly fissured, grained crust and a dull, floury surface.

The selection available is vast: from Bavarian farmhouse bread to Rhenish black bread and Westphalian "pumpernickel" – every region has its own specialty.

Wholemeal wheat and Rye bread. Photos courtesy of Mühlenchemie.

by Martina Mollenhauer and Christof Schricke

Dough acidification is indispensable for reasons of flavor, even with low-enzyme flours

PENTOSANS MAKE BREAD BAKEABLE

The baking properties of wheat and rye differ considerably. Rye flours have a much higher content of starch-degrading enzymes and pentosans than wheat flours, but less protein capable of swelling.

Although rye flour does contain some gliadin and glutenin, these protein fractions do not form a stable, three-dimensional gluten network.

Their percentage in the flour is simply too low, and from the point of view of baking, the ratio of gliadin to glutenin is less favorable than with wheat. Instead, it is pentosans that play a central role in dough formation.

Since these swelling vegetable substances can absorb much

more water during dough preparation than protein and starch, they increase the dough yield and prolong the shelf-life of the products.

THE CORE PROBLEM

In respect of the pasting temperature, too, there are significant differences between rye and wheat. Rye starch already gelatinizes at about 62 degrees C, wheat starch at about 80 degrees C.

The rye starch therefore pastes in a temperature range in which the starch-degrading enzymes are still extremely active. With high-enzyme flours, especially, this constellation can cause problems, for in the presence of strong enzyme activity there is a risk that the amylases naturally contained in the flour will degrade the starch so massively that the water in the dough is no longer bound sufficiently and no cohesive crumb can form during the baking process.

That is why rye flours are traditionally mixed with sour dough or dough acidifiers in order to lower the pH and thus curb the enzyme activity.

ACIDIFIED, LOW-ENZYME RYE FLOURS TEND TO BAKE DRY

However, in recent years the quality of rye flours has changed greatly as a result of breeding measures. Flours now have much lower enzyme activity than in the past. It does not seem necessary, at present, to regulate the pH. There are other reasons why German bakers still acidify their dough. Without the lactic and acetic acid and the diversity of flavoring substances that originate in the fermentation process of a sour dough, the rye loaves would lose their savory, aromatic taste.

So even with today's strong rye flours, it is still common practice to add dough acidifiers or the baker's own sour dough.

However, it must be taken into ac-

count in production that these doughs have a tendency to bake dry, with negative effects on the quality of the products. Typical undesirable effects of low-enzyme, acidified rye doughs are inadequate leavening, a fine texture and an insipid taste to the bread.

This problem can only be overcome by precise adjustment of the preparation method, for example, with softer doughs and longer dough processes. Both industrial and artisan bakeries generally use special flour improvers or baking improvers as an additional aid.

MIXED WHEAT AND RYE LOAVES ARE FAVORITE

Since German consumers like the slightly tart, aromatic taste of rye bread but nevertheless wish for a soft, woolly crumb, they tend to choose mixed loaves containing about 30% to 40% wheat flour instead of loaves made from

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rye flour alone. The following is a recipe for typical mixed rye and wheat bread:

Berlin cottage loaf (mixed rye and wheat bread, 70/30)

10 kg flour mix:

Sour dough: (dough yield 170, 26 degrees C)

3.0 kg rye flour 1150

+ 2.1 l water

5.1 kg sour dough

Dough resting time: 8 hours (to approximately 20 degrees S [acid value, ml 0.1 N NaOH/10 g flour])

Dough:

5.1 kg sour dough

4.0 kg rye flour 1150

3.0 kg wheat flour 1050

0.2 kg salt

0.1 kg yeast

Approximately 5.6 l water

Preparation:

- Dough temperature: 28 degrees C / resting time: approximately 20 minutes.

- At the end of the resting time, weigh and round the dough portions, mold them by rolling in rye flour and place them in bread baskets with the seam underneath.

- Ensure dry proofing; the formation of a skin with cracks is desirable.

- Bake with steam; open the damper after about 1 minute.

- Bake strongly with the damper open.

SLOW MIXING PROTECTS THE DOUGH STRUCTURE

Generally speaking, bread containing rye is more difficult to produce than loaves consisting mainly of wheat. Because of their low gluten content, dark rye doughs are moist and short. They tend to be sticky and have a low gas retention capacity.

Certain requirements have to be met

even at the mixing stage. In order not to destroy the fragile dough structure, the ingredients must be mixed at a low speed and with little mechanical energy. If over-mixed, the doughs become glossy and tend to lose their shape.

BAKING AT MAXIMUM TEMPERATURES

Rye loaves have a smaller volume than wheat loaves. In order to achieve an attractive volume and the desired characteristics of the bread, the baking process must be adjusted exactly to the type of bread concerned.

For many products the rule of thumb is: the higher the percentage of rye, the higher the initial baking temperature. A common procedure is the “prebaking method” in which the dough portions are baked at a temperature of 330 to 430 degrees C for the first two to five minutes. This results in strong crust forma-

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tion and good oven rise.

Intuition is also required where the use of steam is concerned. Too much steam would make the loaves flat; the dough system would stay too moist, and no dry skin would form.

TYPICAL FAULTS IN RYE LOAVES

In Germany, rye loaves are produced

according to countless recipes and methods. The procedure is complex and demands considerable know-how and skill. But even the most seasoned baker is aware that faults in the product cannot be excluded entirely when the raw material used is rye. The following is a brief overview of the most common faults in rye loaves and mixed rye and wheat bread:

Problem: Loaf too flat.

Possible causes: Dough too soft, proof time too long, oven not hot enough.

Solution: Make the dough firmer (reduce dough yield); reduce proof time; start baking at a higher temperature.

Problem: Not enough volume.

Possible causes: Not enough leavening because of inadequate enzyme activity (α -amylases).

Solution: Add enzymes, in particular amylases (e.g. Alphamalt V) or xylanases (e.g. Secabon).

Problem: Texture too close

Possible causes: Dough too firm, proof time too short.

Solutions: Make the dough softer with more water; prolong the proof time.


Problem: Firm crumb, dry and crumbly.

Possible causes: Too much acid in the dough because of too much sour dough; doughs too firm; insufficient enzyme activity of the flour.

Solution: Reduce the amount of sour dough; make the sour doughs softer and cooler; increase the dough yield considerably; add amylases such as Alphamalt V or Alphamalt Fresh for longer-lasting softness of the crumb.

Problem: Taste too acidic

Possible causes: Fermentation time of the sour dough too long; too much sour dough; sour dough too warm; sour dough too acidic; incorrect ratio of lactic to acetic acid.

Solution: Shorten the processing time of the sour dough; reduce the amount of sour dough; optimize the temperature of the sour dough, check the acidity of the sour dough, reduce the amount of starter. The ratio of lactic acid to acetic acid in the sour dough should be 85-90:15-10. 

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