Demanding the best

by Martina Mollenhauer and Stefan Makollus

South African consumers acquire a taste for premium-quality sandwich loaves

Consumers in South Africa have become much more discerning in recent years. There is an increasing demand for premium quality even with their favorite type of bread – wrapped, sliced sandwich loaves. The industry is responding to these requirements with sophisticated process technology and specific flour treatment.

Sandwich loaves are very popular throughout southern Africa. These white pan loaves, sliced and wrapped, are to be found in nearly every household in Mozambique, Botswana, Malawi, Zambia and Zimbabwe as well as South Africa. The soft bread slices are also gaining significance in the form of sandwiches as a take-away snack.

Since there is no intensive grain-growing in South Africa, the mills import most of their wheat from countries like Australia, Russia or Canada. The standard bread flours from South Africa, which are also used for sandwiches, usually have a protein content of 10.5% to 12% and good baking properties.

GOLDEN RULE FOR SANDWICH LOAVES

When making sandwich loaves it is important to consider a number of requirements specific to the product. In the premium segment, South African consumers expect a very attractive volume, an extremely fine, even texture, a soft, light-colored crumb and a shelf-life of 6 to 8 days.

Example of a standard industrial recipe:

- 0.3 % Fat (palm)
- 1.0 % Sugar
- 2.0 % Salt
- 0.5 % Soybean flour (enzyme-active)
- 0.3 % Calcium propionate
- 0.12 % DATEM (80%)
- 0.10 % SSL/MDG
- 0.012 % Ascorbic acid
- Enzymes
- 1.5-2 % Yeast (block)

MACHINE MIXING UNDER PRESSURE

Where process technology is concerned, most industrial bakers in South Africa follow the example of their British

colleagues. In the United Kingdom, the Chorleywood Bread Process is the method most widely used. It involves pressure-vacuum mixing that gives sandwich loaves a very soft crumb with a cotton-wool feel.

The process was developed in England to permit the use of low-protein flours, and it is therefore well suited to the situation in South Africa, too. It has the advantage that the entire process from mixing to the finished loaf only takes about two hours. If subsequent cooling, slicing and wrapping are included, the total time is some 3.5 hours.

By contrast, the sponge-and-dough method takes 4 to 7 hours. The mixing process itself only takes 4 to 5 minutes, depending on the desired energy input and crumb structure. The Chorleywood Bread Process (CBP) combines a high-speed mixer (usually a Tweedy mixer) with the option of varying the pressure. The first phase of mixing takes place at an overpressure of about 2 bar in a closed vessel.

During this phase, large amounts of oxygen are worked into the dough to increase or speed up oxidation. The development of the gluten and dough can therefore already be promoted at the mixing stage.

The second phase of mixing takes place in a partial vacuum at about 0.5 bar. The gas bubbles in the dough thus expand and are then reduced again in size in the high-speed mixer. This increases the number of pores, and the crumb structure can be controlled precisely. If the dough is subsequently worked at normal pressure, the bubbles shrink and the finished bread has the typical, very fine, soft and even texture. A further advantage of the high-speed mixer is that it increases water absorption by 2% to 4%.

Example of the production of sandwich loaves by the CBP:

- Mixing for 8-12 kWh per kg in a pressure-vacuum system
- Dough temperature: 27-30 degrees C
- Drop into a hopper for 3 minutes (min is an SI unit, therefore no full stop)
- Dividing, rounding
- Intermediate proof for 5 minutes
- Moulding
- Proof for 60 minutes at 40 degrees C (at 80% humidity)
- Bake in traveling ovens for about 22 minutes
- De-panning
- Cool in a cooling unit at 20 degrees C for about 45 minutes to 1.5 hours
- Slice at 32 degrees C
- Wrapping.

Since the Chorleywood method makes it possible to improve the quality of the baked goods by physical means, the amount of flour improvers added can be reduced. Nevertheless, some additives and ingredients are essential for ensuring quality even in this process. The oxidizing and flour maturing agent ascorbic acid is indispensable, as are various emulsifiers and enzymes that ensure a fine-textured, elastic crumb and a long shelf-life.

Frequently used additives include DATEM and also SSL and MDG. With their bleaching effect, lipoxygenases from enzyme-active soy flour brighten the crumb. The dosage of amylases is greater than that used with conventional methods because of the short processing time. Whereas malt flours were commonly used in the past, the process is now controlled with enzyme systems consisting of amylases, xylanases and in some cases other activities such as Alphamalt A 6003.

Emulsifiers are essential for another reason, too. Many industrial bakeries in South Africa work with fermentation temperatures of about 40 degrees C in order to reduce the processing time as far as possible and increase the output. This relatively high setting, which places additional stress on the dough pieces, should be compensated for with suitable enzymatic/oxidative flour treatment, using products such as Powerzym S. Emulsifiers like DATEM, SSL and lecithin strengthen the gluten network additionally and ensure stable doughs and good oven rise.

Whereas industrial bakeries generally use single raw materials, oxidizing agents, enzymes and emulsifiers for their sandwich loaves, flour treatment follows a different trend among artisan bakers. Smaller firms with open mixing systems prefer "all-inclusive" baking improvers containing emulsifiers, multi-enzyme compounds and hydrocolloids with a wide range of effects suitable for a number of different yeast-raised wheat bread doughs.

THE WEAK POINTS: CRUMB AND SHAPE

In practice, characteristic faults in the products occur again and again in the sandwich bread sector. They mainly have to do with the crumb structure or the shape of the loaves.

Although a complex analysis of all the production parameters on the spot may be necessary in some cases in order to find the source of the problem, we can give some basic recommendations for avoiding such faults in the bread. The following is an overview of the most common faults encountered in sandwich bread production:

The standard bread flours from South Africa, which are also used for sandwiches, usually have a protein content of 10.5% to 12% and good baking properties.

Problem: The slices are not square, they have round corners. The dough does not fill the mold.

Cause: The dough may be too stable if flour with strong gluten is used.

Solution: More intensive kneading; reduce the amount of oxidizing agent, or supplement enzymatic treatment with xylanases and/or proteases to help the dough relax and fill the corners of the pan.

Problem: The bread does not slice well; the crumb is gummy and sticks to the knife.

Cause: Too much starch is broken down during baking through over-activity of heat-stable enzymes or over-treatment. This reduces the water binding capacity of the crumb and makes it sticky.

Solution: The use of sour or sponge dough or an acidifier lowers the pH and inhibits enzymatic activity. If necessary, treatment with enzymes must be reduced.

Problem: The bread does not slice well, can be squeezed together.

Cause: Insufficient stability.

Solution: The stability of the crumb can be improved by the four-pieces or twist method. In the four-pieces method, the dough portion is cut into four and put together again after turning each piece through 90 degrees. Replacing the pieces in this way gives the dough more stability.

Problem: Large, unequal pores.

Cause: Sub-optimal processing.

Solution: Adjust pressure-vacuum mixing. Longer mixing times improve the characteristics of the bread, while shorter mixing times have a positive effect on machinability. Add emulsifiers (SSL, mono- and diglycerides), enzymes (hemicellulases, lipases) or enzyme-active soy flour (SoyNovo EAS).

Problem: Side wall collapse of loaf.

Cause: Insufficient stability of the bread.

Solution: Change the mixing time, reduce proof time, add more flour improver (oxidation). Use the four-pieces or twist method to shape the dough portion. Sometimes, however, concave sides may be caused by over-strong gluten or excessive oxidative treatment. In such cases, measures must be taken to soften the gluten.

Problem: Thin, soft crust that is too light in color.

Cause: Inadequate enzymatic activity; baking temperature too low, or baking time too short.

Solution: Increase baking temperature and reduce baking time. Enzymatic treatment with vegetable β-amylase, e.g. Betamalt 25 FBD, can be used to enhance browning.

Problem: Impairment of freshness characteristics during storage; firm, inelastic crumb; dry and crumbly.

Cause: Rapid retrogradation of the starch.

Solution: Add emulsifiers like GMS 90, SSL or CSL. Enzymatic treatment with alpha-amylases or maltogenic amylases such as Alphamalt Fresh should be used if the crumb is to have a very long shelf-life. WG

Martina Mollenhauer, product Manager at Mühlenchemie, can be contacted at mmollenhauer@muehlenchemie.de. Nicole von Zyl from Bidvest Bakery Solution in South Africa assisted in the production of this article.

We want to hear from you — Send comments and inquiries to worldgrain@sosland.com. For reprints of *WG* articles, e-mail reprints@sosland.com.