

BAKING UPDATE

Artisan Baking: When Art Meets Science

Practical technology from Lallemand Baking supplying bakers yeast to bakers all around the globe.

DEVELOPING BREAD WITH UNIQUE FLAVORS AND AROMAS

Until recently, artisan bakeries have had the advantage of being more flexible in choosing their baking processes and ingredients to develop unique flavors in bread. Now industrial bakeries can also have options if they pay attention to the fermentation steps.

There is a general misconception that flavor compounds generated during bread fermentation cannot contribute to the flavor profile of bread due to evaporation during baking. However, yeast- and lactic acid bacteria-derived compounds greatly contribute to the generation of aroma precursors in thermal reactions during baking and the overall flavor profile of bread.

Flour contains many aroma precursors, which can be revealed through the natural enzymatic actions of yeast and bacteria. Therefore the flavors and aromas in bread will depend mainly on the type of flour used, and fermentation and baking techniques. When the same flour and recipe are used, then the choice of fermentative ingredient, i.e. the use of varying strains of yeast and bacteria, is also essential to produce breads with different flavor profiles. It is therefore possible to enhance and differentiate the aroma of your bread to obtain specific characteristics by choosing the right yeast and/or lactic acid bacteria combination.

FERMENTATION METABOLITES

Through the action of the enzymes naturally occurring in the yeast, fermentation will generate carbon dioxide gas which will raise the dough. This fermentation process will also generate volatile organic compounds (e.g., higher alcohols, aldehydes, sulfur-containing compounds, esters, phenols, carbonyl compounds, organic acids) which may significantly affect bread sensory qualities. The volatile esters, aldehydes and secondary alcohols are the most significant flavor compounds produced during the dough fermentation by bakers yeast, are of particular interest in bread, because they contribute pleasant fruity and buttery flavor notes.

Sourdough naturally contains lactic acid bacteria and bakers yeast. Indeed studies of the microbiota obtained from many different sourdough revealed the presence of the lactic acid bacteria *Lactobacillus sanfranciscensis*, *plantarum*, and *paralimentarius* and of the yeast *Saccharomyces cerevisiae*. Working in synergy, those microorganisms seem to benefit from the presence of each other by secreting metabolites that stimulate their growth. Sourdough fermentation will also generate aromas and organic acids in unique concentrations leading to specific flavor profiles.

DEVELOPING BREAD FULL FLAVOR POTENTIAL

Usually an extended proof time is required for bread flavors to fully develop. The yeast and lactic acid enzymatic activity in the dough begins with kneading. This is therefore a key step in developing unique flavors in bread.

Bakeries with time limitations may add a pre-ferment step to obtain the benefits of a long fermentation, i.e. flavor development, but also proper gluten strength and longer shelf life [4, 5]. The pre-ferment is generally prepared several hours prior to the mixing of the final dough using a portion of the bread dough. Depending on the water to flour ratio, this "fermentation starter" can have a stiff to loose texture. A portion of the dough from a previous production, often referred to as "old dough" may also be added to the final dough. Its flavor profile and intensity will depend on the quantity used (usually up to 25% flour weight of the new dough) but also on the degree of maturity of the dough (should be fermented for at least 3 hours).

Poolish fermentation involves the preparation of a pre-ferment composed of a liquid flour-water mixture in a ratio of around 1:1. The quantity of yeast will be added according to the time allowed for fermentation, hence less yeast will be added for longer fermentation and vice versa.

When talking about flavor development in sourdough bread, a long fermentation (12-24h) time is required. The lactic acid bacteria fermentation will generate lactic and acetic acid in the dough that will contribute to the acidity in the bread. Other desirable volatile aromatic compounds, including alcohols, aldehydes, ketones, esters and sulfur will be generated during such a long fermentation process. ●

CONSENSUS AMONG YOUNGER GENERATIONS

According to the 2019 national research on consumer behavior presented by the American Bakers Association and the Center for Generational Kinetics, most Millennial (born between 1977 and 1995) and Gen Z (born after 1996) eat baked goods regularly. Indeed, almost 75% of younger consumers surveyed declared having purchased bread in the past few days.

Concerned about their environment and health, these two generations are looking for whole grains, and fresh-baked goods made from natural and responsibly sourced ingredients. As this demographic is becoming more health conscious, they pay attention to labels and nutrition cues. Millennials and Gen Z consumers read and look at health descriptors to help them find baked goods with the added benefits.

Taste also seems to be an important component in helping younger consumers make their bread choices. Open to new experiences, they love the opportunity to taste before buying in-store.

While the industry focuses on meeting consumer's desire for nutritional and tasty baked goods, it should not neglect the emotions associated with "bakery" when consumers top-of mind words include delicious, good, great, wonderful, aroma, memories and childhood.

Adapting formulations to these market trends, bakeries may need to try new ingredients and different baking processes. Bakers yeast and sourdoughs play a key role in the leavening of dough, but these natural ingredients can also provide bread with a unique taste, help with its digestibility and contribute to its nutritional qualities. ●

Health and Wellbeing

As mentioned, consumers are concerned with health and avoiding artificial ingredients. Longer fermentation has a big impact on the development of flavor components, but it also confers health benefits like improving bread digestibility or improving the bioavailability of certain micronutrients.

Gluten from cereal constitute a good source of important bioactive compounds that can be released in bread by yeast and lactic acid bacteria. Opioid peptides generated from yeast have analgesic action on the central nervous system or induce prolactin secretion. Gluten exorphin A5 stimulates post-prandial insulin release. Short chain fatty acids generated by yeast fermentation can increase insulin sensitivity and satiety, have antimicrobial properties, and reduce proliferation of neoplastic gut epithelial cells.

Interesting peptides can be generated by the proteolytic activity of lactic acid bacteria. Some of these may have various health properties:

- Nutritional effects: mineral absorption and oxidative stress protection
- Metabolic effects: blood glucose and cholesterol lowering
- Cardiovascular effects: antithrombotic and hypotensive action
- Immune effects: microbial inhibition and immunomodulation
- Psychological effects: opioids and anti-opioids controlling mood and food intake.

Seeds fermented by yeast and bacteria can also contribute important bioactive compounds, notably γ -aminobutyric acid and natural phenolics, which possess versatile bioactivities such as antioxidant and anticancer effects.

Low FODMAPs Baking

The concept of low FODMAPs baking is slowly increasing in popularity. The term FODMAPs refers to Fermentable Oligo- Di- Monosaccharides And Polyols, a group of carbohydrates of diverse complexity. These are non-starch oligosaccharides poorly absorbed in the small intestine and rapidly fermented in the large intestine.

Certain FODMAPs including fructan, galactooligosaccharide and mannitol are present in bread depending on the type of flour and fermentation processes used.

Conventional bakers yeast and sourdough fermentation have the ability to decrease some FODMAPs while at the same time generating others. Prolonged dough proofing times (>4 hours) with bakers yeast can reduce fructan levels of the final product by up to 50%. During sourdough fermentation, fructose is partially converted by lactobacilli to mannitol, another type of FODMAP.

Conventional bakers yeast and sourdough fermentation can also improve the bioavailability of certain nutrients present in bread. Yeast fermentation will generate B-complex vitamins. Compared to unfermented flour and water mixtures, there is 3 times more folate (vitamin B9) in fermented products. Sourdough fermentation seems to degrade phytates, undesirable compounds that tend to complex with minerals, such as iron, zinc, calcium and magnesium, thereby limiting their absorption. ●

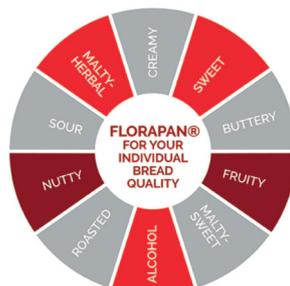
Develop Your Signature Bread with Lallemand Baking Solutions

Lallemand Baking is a leading producer of yeast and baking ingredients that strives to be not just a supplier, but a long-term partner. Our success depends on yours, so we are focused on your needs. Our high quality, cutting-edge, custom made solutions can help you develop your signature bread and contribute to "Raising Baking Standards".

Design your signature bread or improve your bread flavor with our **Florapan®** aromatic yeasts. These natural yeast solutions were selected because their fermentation metabolite can contribute malty, fruity, almond, flower, acidic, brioche, creamy, buttery or honey flavor notes to bread.

Lallevain® 100% natural sourdough powder, enhances the flavor profile of your products without using a long fermentation. Designed to provide more flavor, with improved crust and color, it can be used in direct process under controlled fermentation.

EuroPremix® dry flavor bases for bread and rolls, pizza, crackers and croutons provide natural fresh flavor, aroma and color. They can improve crust and crumb structure in artisan bread. Designed for salty and sweet dough applications, many flavors are available (pesto, Mexican Mole, Pico de gallo, tomato, and more). ●



MAKING A CLEAN LABEL BREAD

Having a clean label on packaging of rolls and buns, bagels and sweet goods can be a winner strategy. Did you know that succinic acid is a major organic acid produced by yeast during dough fermentation. This fatty acid has several effects on the dough properties:

- Makes dough less extensible and increases the resistance to extension.
- Strongly reduces gluten agglomeration, but leads to gluten polymer swelling.
- Leads to swelling and unfolding of gluten proteins, thereby increasing their interaction potential and dough strength, but simultaneously increasing intermolecular electrostatic repulsive forces.

Wheat flour fermentation with the lactic acid bacteria strain *Lactobacillus plantarum*, commonly found in sourdoughs, will produce exopolysaccharides. These types of carbohydrates can naturally improve the texture and color of the crumb and the crust. Indeed, significantly different bread crumb/crust moisture content, firmness and color, and bread volume can be obtained depending on the type of strain and concentration of *Lactobacillus plantarum* present in the sourdough [16]. Sourdough contribution to the natural dough acidification, can work in synergy with shelf life extenders (calcium propionate, vinegar, wheat culture). ●

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Lallemand Baking Update is produced by Lallemand to provide bakers with a source of practical information and technology for solving problems. If you would like to be on our mailing list to receive future copies, or if you have questions or comments, please contact us at:

LALLEMAND Inc. | 1620 Préfontaine
Montréal | QC | H1W 2N8
CANADA
tel: (800) 840-4047 (514) 522-2133 |
fax: (514) 255-6861
email: baking@lallemand.com |
www.lallemandbaking.com

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