

# BAKING UPDATE

## Sweet Goods

Practical technology from Lallemand Inc., parent of American Yeast Sales, producers and distributors of Eagle® yeast, fresh and instant.



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## Yeast Activity And Sugar Level

Sugar has a strong inhibitory effect on the gassing power of yeast. A sweet dough with 20 percent sugar requires about three times more yeast to obtain the same gas production as a typical lean dough. The shape of the gassing curve is also changed, with an initial adaptation period of only about 10 minutes before almost constant gas production in a lean dough, compared with several hours in a high-sugar dough.

The difference in yeast activity is caused by osmotic pressure. The dissolved sugar exerts a high osmotic pressure on the yeast cell, which initially causes it to dehydrate and shrink. As the yeast cell adapts it synthesizes various metabolites, such as glycerol. As the level of metabolites increases, the internal osmotic pressure rises while the yeast increases its gas production activity.

The sugar tolerance of a yeast is affected by the yeast strain. Some strains adapt better to a high-sugar environment and are commonly used for breadmaking in Southeast Asia where high-sugar formulas are common. These strains (mostly supplied as instant dry yeast for high-sugar dough) are usually slower than regular yeast in lean dough.

Yeast producers also make trade-offs in the production process that affect yeast performance for different uses. Normally, higher activity in high-sugar applications goes together with better keeping quality (stability during refrigerated storage) but results in yeast with lower lean dough activity.

Bakers can also modify yeast performance in high-sugar dough by changing the breadmaking process. Changing from a no-time straight dough process with a short bulk proof to a straight dough with a long (more than one-hour) bulk proof gives the yeast more time to adapt and can give a considerable improvement in gas production during the final proof. 

## Sweet Goods Composition and Characteristics

**S**WEET GOODS are bakery products made from wheat flour with a relatively high level of sugar in the dough. They are not a well-defined category but usually include yeast-raised products like cinnamon buns, donuts, sweet rolls, hot cross buns, coffee cakes, pannatone, brioche, Danish pastry, and croissants. Sometimes the broader category of “breakfast goods” is used, or other chemically leavened products are included, like puff pastry, sponge cake, pound cake, and cake donuts. Many sweet goods are finished with fillings and toppings in the form of icings, glazes, fruit jellies, nuts, etc., that give these bakery products a luxurious character more like a pastry product than a breadlike product.

In addition to high levels of sugar, most sweet goods are made from rich formulas with high levels of shortening, milk solids, and whole eggs. The combination of ingredients contributes to the appearance, flavor, texture, mouthfeel, and keeping quality of the final product. Ingredients also have direct and indirect effects on the gas production and gas retention that provide leavening.

High sugar levels greatly inhibit the gassing activity of yeast. With sugar levels

between 10 and 20 percent, higher yeast additions or special sweet dough yeasts are needed to achieve adequate proofing. At sugar levels over 30 percent, the amount of yeast required becomes so great and its effect on flavor so pronounced that it can no longer be used for leavening.

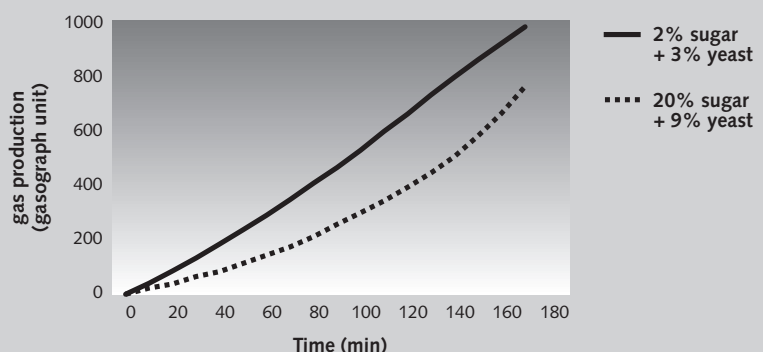
High sugar levels also interfere with gluten development. The dissolved sugar reduces the water activity and inhibits the interaction of the gluten proteins during mixing. This can prevent proper development of the gluten structure and decrease the gas retention capacity of the dough.

Roll-in fat is used in laminated dough products like croissants and Danish pastry to overcome the poor gas retention and low volume. The laminated fat acts as a barrier to trap the carbon dioxide and water vapor generated during baking. The volume of a finished croissant depends greatly on the characteristics and melting point of the fat used, along with the laminating procedure (which normally includes refrigeration between successive laminations). Dough relaxing agents can also be used to reduce the stress during sheeting.

Eggs are the critical leavening ingredient in other high-sugar products. They help

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### GASSING POWER OF YEAST



## DONUT FORMULAS

INGREDIENT	% BASED ON TOTAL FLOUR	
	CAKE DONUT	YEAST-RAISED DONUT
Bread flour	35	100
Pastry flour	65	-
Water	40 (optimal)	60 (optimal)
Sugar	40	10
Salt	1.5	1.5
Nonfat dry milk	3.5	3.5
Egg solids	5 (variable)	5 (variable)
Yeast (fresh)	-	5
Shortening	6	10
Baking powder (SAPP, MCP, baking soda)	4	-
Flavoring/coloring	optional	optional

## Lallemand Products for Sweet Goods

**L**ALLEMAND INC. is a leading producer of yeast and dough conditioners and supplies a full range of products to the baking industry through its subsidiaries Lallemand Distribution and American Yeast Sales. For production of sweet goods the following products are available:

### YEAST

Lallemand supplies Eagle® fresh yeast in blocks, bags, and cream. Lallemand produces and markets instant yeast under the InstaFerm® and fermipan® brand names. While fermipan® brown is the instant yeast of choice for high-sugar applications (greater than 15 percent sugar), fermipan® blue is advised for sweet goods with 8 to 15 percent sugar, and fermipan® red is the instant yeast of choice for baked goods with less than 8 percent sugar based on flour. These instant dry yeast products are available in 450-gram and 15-kilogram packaging.

### DOUGH CONDITIONERS

Lallemand supplies a full range of dough conditioners under the Eagle®, Fermaid®, and Essential® brand names used for bromate replacement, crumb softening, dough relaxation, and general improvement of bread quality. For sweet goods production the following products have found special applications:

- Fermaid® Relax and Essential® LCR-100 help improve the quality of croissants and Danish pastry. These products are based on inactive yeast and act as natural replacers for L-cysteine to reduce the stress on the croissant or Danish pastry dough during sheeting.

- Fermaid® Plus and Fermaid® XTR bread improvers are also used to improve the appearance and volume of croissants and Danish pastry.
- Fermaid® products are also available for improving the softness and moistness of cake muffins, brownies, and cakes.


### BAKING POWDERS

Lallemand produces and supplies baking powders under the Eagle® brand name for a wide range of applications, including the production of sweet goods. Both single- and double-acting baking powders are available as well as custom-made products to fulfill special requirements in the production of sweet goods and other bakery products. Baking powders are available in reusable 10-pound pails and 50-pound bags.

### OTHER PRODUCTS

Lallemand offers a wide range of other bakery ingredients that are used for production of sweet goods:

- Preservatives (propionates, sorbates)
- Shortenings (oils, butter, margarine)
- Chocolate, cocoa
- Eggs (liquid, dried)
- Milk products
- Fruits
- Nuts (hazelnuts, walnuts, coconut)
- Raisins
- Spices
- Sweeteners


All Lallemand products are backed by technical support from experienced bakery technicians. 

## Sweet Goods Composition and Characteristics

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form a foamlike structure to retain the gas produced by baking powder in sponge and pound cakes.

Chemical leaveners for breadlike products are usually based on glucono-delta-lactone (GDL) as the acid ingredient. Like yeast, GDL releases carbon dioxide gradually and constantly during proofing. It also avoids the poor gas retention and low volume caused by the interaction between gluten proteins and negatively charged ions from phosphate- and pyrophosphate-based baking powders.

Chemical leaveners that are not based on GDL usually provide a structure that is quite different from a yeast-raised product. When comparing a yeast-raised donut formula to a chemically leavened cake donut formula (see table), the main differences are the sugar level and the use of baking powder instead of yeast. There is also a difference in flour, since yeast donuts require a strong flour suitable for breadmaking, while cake donuts are usually made from a weaker mixture of bread and pastry flour. The differences in the finished products are even greater. A typical yeast-raised donut has an open elastic crumb structure and a high volume like bread, while a typical cake donut has a dense cakelike structure that crumbles easily. 

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## BAKING UPDATE

*Lallemand Baking Update* is produced by Lallemand Inc. to provide bakers with a source of practical 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:

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