

BAKING UPDATE

Bagels

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



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Bagel Production

TODAY the bagel market allows for bagels to be produced in a variety of ways:

Wholesale

- As frozen dough, proofed and boiled before being frozen
- Par-baked or fully baked and frozen for distribution

Retail/food service/in-store

- Baked off from frozen dough or frozen par-baked
- Fresh-baked from scratch or mix

BAGEL PRODUCTION PROCESS

Mixing of a low-absorption bagel dough is very energy-intensive. It is important to properly size the mixer to batch size and energy requirements. Spiral mixers are recommended for small- to medium-sized bakeries, whereas horizontal mixers are feasible for high-production facilities.

The dough is mixed on low to medium speed until it is extensible. Optimum final dough temperature is 78°–82°F. Higher temperatures make the process more difficult to control and prone to inconsistency.

Makeup is carried out after giving the dough little or no floor time. Automated lines use a rotary knife divider with a former. However, many small shops still divide and form bagels by hand. A typical scaling weight is three ounces (eighty-five grams).

Retarding is an important step for flavor development and dough relaxation. Long retarding times ensure a flavorful product as a result of fermentation by yeast and lactic acid bacteria. Also, the products of fermentation and enzymes in the flour and the dough conditioner work to relax the dough. Many bakeries eliminate the retarding step and so become more susceptible to final product variation. Retarding time is typically 12 to 18 hours at 35°–42°F.

Proofing conditions depend on whether the product was retarded. If retarded, the bagels are allowed to sit at room temperature for thirty minutes to warm up, covered to prevent drying. Then they are proofed for twenty to thirty minutes at 85°–90°F and 65–75 percent RH. If not retarded, the bagels go directly into the proof box for twenty to thirty minutes at 100°–105°F and 65–75 percent RH. At the end of proofing, the bagels should be no larger than one-half their final size.

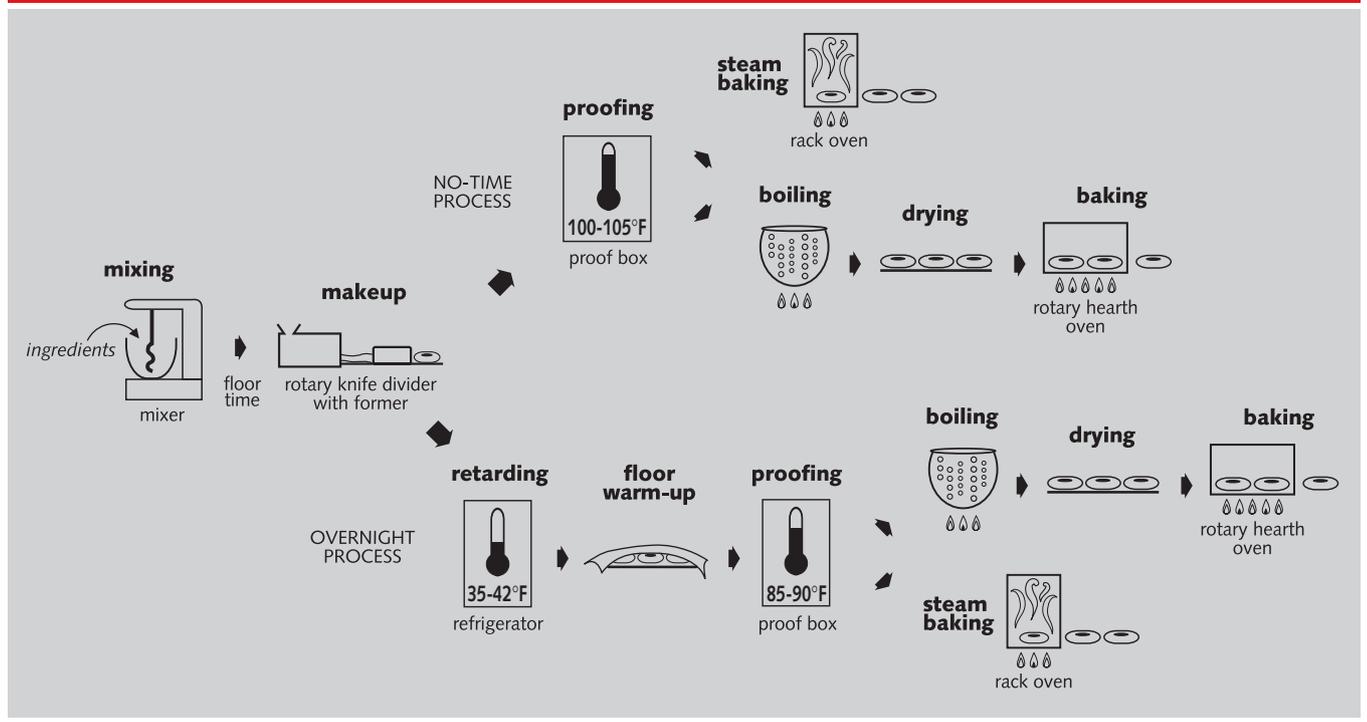
Boiling serves three main functions:

1. To give a shiny appearance and a thick, crisp crust. This is a result of the gelatinization of starch on the surface that sets the crust.

2. To inactivate the yeast. Bagels should be boiled long enough for the internal temperature to reach 130°F; at this point, yeast fermentation has ceased.

Continued

BAGEL PRODUCTION PROCESSES



The Effect of Ingredients on Bagel Production and Quality

FLOUR

The protein level of flour is one of the primary determinants of the "bite," or mouthfeel, of the bagel. Higher protein will give more bite to the bagel (a thicker, crisper crust and greater chewiness). Lower protein will give characteristics more similar to those of a roll (less crust and a softer, more tender mouthfeel).

YEAST

Fresh yeast levels range from 0.5 to 2.0 percent, depending mostly on the production process. Retarding overnight allows for less yeast, while a no-time process requires more yeast. Obviously, the density or mouthfeel of the product depends on yeast level.

Instant dry yeast is a good alternative to fresh yeast. Some guidelines for using instant yeast are:

- When converting from fresh yeast, the conversion factor is higher than the recommendation for other doughs: one-half or 50 percent (one pound of fresh yeast equals one-half pound of instant yeast).

- Avoid contact between cold water and instant yeast. Yeast activity will be reduced and dough slackening may occur.

- Add instant yeast last, after thirty seconds of mixing. Evenly distribute the yeast. If rehydration of the yeast is preferred, use 95°–105°F water. Rehydration only slightly increases activity of instant yeast in a bagel dough.

VEGETABLE SHORTENING

Vegetable shortening (oil) is also a primary determinant of the mouthfeel of the bagel. Increasing the level of shortening or oil gives greater softness and tenderness, but volume will decrease at levels greater than 3 percent. If roll-like softness is desired, enzymes or emulsifiers are recommended. The use of vegetable shortening is more desirable than oil for eating quality, especially at higher levels.

SUGAR

Sugar affects crust color through a reaction between a reducing sugar and protein called the Maillard reaction. Granulated sugar, dextrose, corn syrup, and HFCS all give the same effects and are used equally well by yeast to produce carbon dioxide. Granulated sugar (sucrose) is not a reducing sugar but is converted into the reducing sugars glucose and fructose by yeast.

Higher levels of sugar act as a crumb

softener (by retaining moisture) and also accelerate softening of the crust.

NONDIASTATIC MALT

Nondiastatic malt is often used alone or with another sweetener. It contributes more to crust color and flavor than do other sweeteners. Besides containing maltose sugar, nondiastatic malt also contains peptides which enhance Maillard browning.

Diastatic malt is normally not recommended because of the presence of protease, especially in a retarded product.

WHEY AND NONFAT DRY MILK

Whey and nonfat dry milk contain lactose and milk proteins, which contribute to Maillard browning. Lactose is not fermented by yeast. Both are used to enhance taste and aroma, but nonfat dry milk is more effective.

DOUGH CONDITIONERS

Dough conditioners used generally comprise emulsifiers, enzymes, and oxidants. Each has various functions:

Emulsifiers are only necessary in bagels when a softer, more tender mouthfeel is desired or when producing frozen dough bagels. Some form of monoglycerides is most commonly used as a crumb softener. Sodium stearoyl lactylate (SSL) or diacetyl tartaric acid ester of mono- and diglycerides (DATEM) is recommended for frozen dough bagels.

Enzymes can also be used as crumb softeners or fermentation/processing aids in bagels.

Oxidizing agents provide several benefits. The most evident effects are on volume and appearance, due to strengthening of the protein network and improvement in gas retention. Bagels generally require less oxidation than do bread and rolls.

Recommended oxidizing agents are ascorbic acid or ADA (azodicarbonamide). Ascorbic acid is preferred for frozen dough bagels. This oxidant gives sufficient oxidation in frozen dough applications and does not cause some of the problems associated with overoxidation when dosed at higher use levels. 

THE BAGEL FORMULA

High protein flour (14%)	100.0%
Water	50.0%
Fresh compressed yeast OR Instant dry yeast	0.5 – 2.0% 0.25 – 1.0%
Salt	2.0%
Vegetable shortening/oil	0 – 3.0%
Sugar*	0 – 3.0%
Dough conditioner	0 – 2.0%

* Sugar can be supplied by sucrose, dextrose, corn syrup, HFCS, nondiastatic malt, honey, molasses, whey, and nonfat dry milk.

Bagel Production (Continued)

3. To give a chewy mouthfeel characterized by low volume and high density from a high-gluten flour.

If bagels expand wildly in the oven, they probably were not boiled long enough, have a yeast level that is too high, or both. Boiling time is generally one minute on each side for a three-ounce bagel. Slightly longer times may be needed for larger bagels. After boiling, a short drying time is necessary. If boiling is not possible, the product is baked with steam to set the crust.

Baking is normally done in a rotary hearth oven if boiled, and a rack oven with steam if not boiled. Baking times normally range from 17 to 25 minutes. Baking temperatures range from 400° to 450°F. Lower temperatures and longer times give a thicker crust. 

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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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