

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



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## Cracker Production

**C**RACKERS are a category of crisp baked goods, chemically leavened or fermented. Soda crackers, or saltines, are a traditional type of fermented cracker, produced from a laminated dough. Snack crackers are also produced from a laminated dough, but with added flavoring and less fermentation time.

### SALTINES

Saltines are normally produced using a sponge and dough process with a long bacterial fermentation. The bacteria can be contributed by the yeast, flour, recycled dough, and held-back sponge. The held-back sponge is also referred to as a “mother” or “buffer.”

The sponge contains 60 to 70 percent of the flour and is allowed to ferment in troughs at 78° to 84°F (25° to 29°C) for 16 to 19 hours. During this time, acids are produced by the bacteria, and the pH drops from about 6 to 4. Flour contains a proteolytic enzyme with an optimum pH of about 4.1. The action of this protease during fermentation is believed to modify the dough properties, making the dough more extensible, less elastic, and thus easier to

sheet. The fermentation also contributes to a desirable taste and flavor.

After fermentation, the sponge is added to the remaining ingredients and mixed for 3 to 7 minutes. Sodium bicarbonate is added to produce carbon dioxide and to raise the dough pH to 7 to 8.

After mixing, the dough again ferments in troughs for 3 to 6 hours. The high pH inhibits additional acid production by the bacteria but allows yeast fermentation to continue.

The fermented dough is sheeted and laminated into 7 or 8 layers with a combined thickness of about 0.1 inches (2 mm). The laminated dough is scored partway through to form the individual crackers without separating them. The dough is also docked, or stamped with pins, to form the pattern of holes that hold the laminations together and prevent the finished cracker from separating into layers. Salting is the last step before baking.

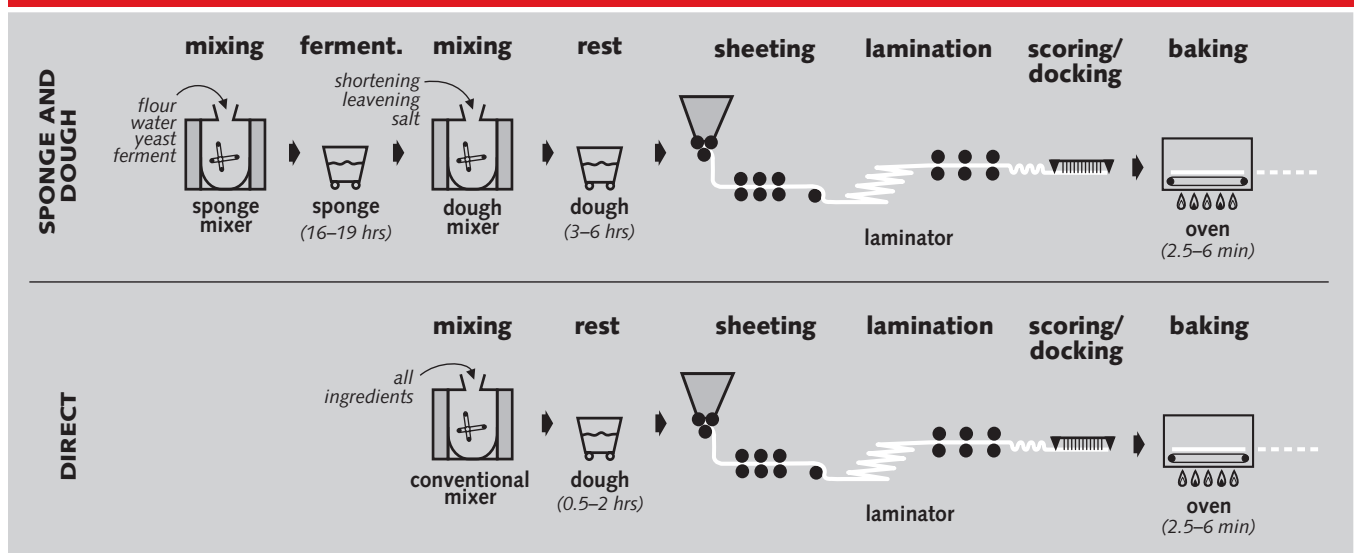
Baking takes place at about 450° to 600°F (230° to 315°C) for 2.5 to 6 minutes. The high temperature produces steam that expands the volume of the cracker, and the crackers move through the oven on wire mesh that allows moisture to escape from both sides.

After baking, the crackers are allowed to cool, broken into individual pieces, and packed in moisture-proof bags. Crackers have about 2 to 2.5 percent moisture content when packaged. The package is important for maintaining the low moisture content that gives the cracker its brittle texture. After opening the package, crackers stale rapidly and lose their brittleness by taking up moisture from their environment.

Saltines require only a few basic ingredients. Flour is typically a soft red winter clear type with a protein range of 8 to 10 percent. Malt can be added in the form of diastatic malt flour or extract. Water levels are kept low in the sponge and dough to minimize gluten development and shorten baking times. Yeast is added to the sponge side at a low level, partly as a source of lactic acid bacteria. Shortening was traditionally lard but is now usually partially hydrogenated vegetable oil. It can be added to the sponge or dough without affecting fermentation or dough development. Salt can also be added to the sponge or dough, usually with an additional 2.5 percent of dough weight applied before baking.

*Continued*

### CRACKER PRODUCTION METHODS



## Cracker Production (Continued)

### SNACK CRACKERS

Snack crackers are normally produced using a straight dough, or "direct," process without an extended fermentation. All ingredients are added to the mixer, mixed once, and allowed to rest for 30 minutes to 2 hours. L-cysteine and sodium metabisulfite are commonly used as reducing agents to break down the gluten and relax the dough.

The dough is usually sheeted, laminated, and baked similarly to saltines. Snack cracker shapes and sizes vary greatly, so cutting steps also vary and usually generate more waste dough for recycling.

Snack cracker ingredients also vary more widely than do saltine ingredients. Yeast and malt are usually reduced or eliminated. Chemical leavening is provided in the form of sodium bicarbonate and ammonium bicarbonate, with cream of tartar (monopotassium tartrate) as the leavening acid. Shortening is usually increased. Salt, sugar, flavor, and color ingredients depend on the specific product. Cheese powder is a common ingredient in snack crackers, normally added at 12 to 16 percent, but baking tends to strip away the subtle cheese taste.

### PROCESS AND RECIPE VARIATIONS

The direct process produces crackers without a traditional fermented flavor, while the conventional sponge and dough process requires up to 28 hours and considerable floor space. Variations in process and recipe have been developed to shorten or eliminate the lengthy sponge while addressing some of the shortcomings of a direct process.

A wide variety of commercial liquid and dry flavors can be added to the dough to improve taste and flavor of a no-time


cracker. Some flavor products have been developed to introduce a fermentation flavor by adding the same organic acids (acetic and lactic acid) as produced in a conventional sponge fermentation. Other flavor products are based on inactive yeast, which contributes a basic yeasty taste without the typical fermentation components produced by yeast. Some inactive yeast products are used in cheese crackers to enhance the taste and flavor of the cheese and to replace some of the cheese, thus saving on total formula costs. Inactive yeast products also contain glutathione, a natural dough-relaxing agent that improves dough extensibility similarly to chemical reducing agents like L-cysteine or sulfite.

Reducing agents like sodium metabisulfite, L-cysteine, or inactive yeast can be added to improve dough extensibility, which facilitates sheeting and lamination of a no-time cracker dough. Proteases are a label-friendly alternative to L-cysteine and sodium metabisulfite but require warmer temperatures to work efficiently. While reducing agents and proteases will improve dough sheeting and lamination so a sponge is no longer required for proper dough handling, they may cause hardness and brittleness and contribute to checking, especially when added to the sponge or when their dosage is not properly controlled.

Because a complete elimination of the sponge remains problematic in the production of high-quality crackers with a typical well-rounded and complex flavor profile, several systems have been developed to reduce the lengthy sponge fermentation. Starter cultures containing lactic acid bacteria and yeast can be added to the sponge to shorten sponge time. A liquid ferment or brew can also be used to shorten

## CRACKER FORMULAS

INGREDIENTS	SPONGE & DOUGH	DIRECT METHOD
<b>SPONGE</b>		
Flour	65%	
Starter	0.1%	
Dough conditioner	0.01%	
Yeast	0.2%	
Water	30%	
Shortening	6%	
Malt	1%	
Fermentation	18-20 hrs	
<b>DOUGH</b>		
Flour	35%	100%
Water	1%	25%
Yeast		0.5%
Salt	1.4%	1.4%
Shortening	6%	12%
Dough conditioner		0.15%
Soda	0.7%	0.7%
Liquid sour		20%
Dough fermentation	3-4 hrs	0.5-2 hrs

sponge time and to avoid the use of dough troughs. A liquid brew is made by mixing water, flour, sugar and yeast or a starter culture, which is fermented for 12-24 hours. Bacterial proteases can be added at the dough side to further shorten the required dough fermentation time. The potential benefits are a 50 percent reduction in processing time, a more automated fermentation process, and a cracker quality similar to that with a conventional sponge and dough process. 

## Cracker Problem-Solvers


**L**ALLEMAND/American Yeast offers a selection of quality products suited to cracker and dry biscuit production.

**Lallemand 1 Step® bakery starters** can be used in cracker production to better control the fermentation in a conventional sponge and dough or liquid brew process. Each starter is able to reduce the pH sufficiently to allow the enzymes to break down the gluten. Also, each starter brings a slightly different flavor to the finished cracker. DV1-12 provides the closest to a traditional cracker taste.

**Fermaid BCR®** was developed for use in both sponge and direct method cracker production. Fermaid® BCR is a unique blend of primary grown inactive yeast with bac-

terial protease and fungal enzymes to efficiently break down the protein network while improving layer separation during bake with optimum stack height. Checking is also reduced or eliminated.

**LBI 2130®** and **LBI 2533®** are inactive yeast products used as taste and flavor enhancers for crackers. Their natural dough-relaxing effect from glutathione also improves sheeting and lamination. LBI 2130® introduces a more yeasty taste and flavor profile. LBI 2533® enhances the "tangy" flavor of cheese by increasing tanginess on the tongue.

**Eagle®** baking powders and other chemical leaveners are also available for use in cracker production. 

## LALLEMAND 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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