



Enzyme Development Corporation

505 8th Avenue, Suite 1500, New York, NY 10018

(212) 736-1580

E-mail: info@EnzymeDevelopment.com

FRESH-N[®] Baking Industry Product Bulletin

FRESH-N[®] Heat resistant alpha amylase derived from *B. liquifaciens* (formerly *B. subtilis*) helps retain moisture and aroma and extends the shelf-life of low fruit content fruit cakes, brownies and date bars. The enzyme also is recommended for use in sweet goods such as sweet rolls, coffee cakes and similar products as well as bread, buns and cake mixes.

WHY FRESH-N[®] AMYLASE IS EFFECTIVE

Investigations into the nature of staling indicate that one of the factors involved, the firming of the crumb, is caused by a phenomenon known as retrogradation. Retrogradation is the process whereby the hydrated amylose fraction of starch reverts to a crystalline water insoluble form by the expulsion of water.

FRESH-N[®] high temperature stable amylase, because it retains its activity even at baking temperatures, breaks the hydrated starch into smaller fragments. These smaller starch fragments do not retrograde as the large amylose molecules and thus are useful in retaining fresh-baked quality, retarding the firming process, and promoting better distribution of moisture within the baked goods.

WHEN TO ADD FRESH-N[®] AMYLASE

It is dissolved in a part of water used in the formulation and is added at the time water would normally be added to the dough or batter. In the event that milk or eggs are used instead of water, **FRESH-N[®]** amylase may be mixed with the milk or dispersed in the eggs.

HOW TO USE FRESH-N[®] AMYLASE

It is used in fruitcakes, sweet goods, brownies and similar products.

For these applications the quantity of **FRESH-N[®]** amylase required to improve keeping qualities and tenderness depends upon the nature of the formulation. The following table indicates the range of concentration at which this product has been found useful in these types of baked goods.

	LEVEL	BASED ON WEIGHT OF
Yeast raised sweet dough	0.08 – 0.25%	Flour
Coffee rings	0.25 – 0.60%	Flour
Fruit Cakes	1.0 – 2.0%	Flour
Chocolate brownies	About 1.0%	Flour and crumbs

Because of the reactivity of **FRESH-N[®]** amylase at elevated temperature, it is suggested that the lower level of enzyme be used in the first baking test. In subsequent tests, the quantity of **FRESH-N[®]** heat resistant alpha amylase may be increased by small amounts until the desired characteristics are obtained.

FRESH-N[®] AMYLASE IN BREAD AND ROLLS

FRESH-N[®] heat stable amylase may be used in continuous, conventional or straight dough baking operations at levels of .25 to .5 ounces for each 100 pounds of flour. Because of its reactivity

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at elevated temperatures, it is suggested that the lower recommended level of enzyme may be used in the first baking test. In subsequent bakes, the quantity of enzyme may be altered by small amounts until the desired effect is obtained.

Full scale production runs in continuous and conventional (sponge-dough) bakeries have confirmed the observations of Waldt and Mahoney. These authors found that it was not necessary to adjust the enzyme content for each specific lot of flour and that its use does not require any change in the baking formula, baking time, or oven temperature.

CONTINUOUS BAKING

In continuous bakeries where no flour is added to the brew, the enzyme should be added to the brew state at levels of .25 to .60 ounces for each 100 pounds of flour in the total formula.

During the preliminary evaluation, we suggest that no change, except the addition of **FRESH-N®** high temperature stable enzyme be made in the ingredients formula. After differences between rates of staling in your regular production loaf and the enzyme processed loaf have been established, more modifications may be made in the basic formula.

CONVENTIONAL SPONGE-DOUGH OPERATIONS

In the conventional sponge-dough operations, **FRESH-N®** amylase should be added at the dough stage at levels of .25 to .50 ounces for each 100 pounds of flour in the formula.

During the preliminary evaluation, we suggest that no change, except for the addition of **FRESH-N®** amylase be made in the ingredients formula. After establishing the differences between the rate of staling of regular production bread and high temperature stable amylase treated bread, adjustments may be made in the ingredients.

STRAIGHT DOUGH PRODUCTS

FRESH-N® alpha amylase may be used at the normal levels required for the conventional sponge-dough products. Usual levels are .25 to .50 ounces per 100 pounds of flour in the total formula.

FRESH-N® AMYLASE IN CAKE MIXES

The use of **FRESH-N®** amylase in prepared cake mixes usually contributes to: less crumbling, easier slicing, greater moisture retention, improved keeping qualities without any adverse effects on crumb structure and volume. The levels of **FRESH-N®** alpha amylase recommended in the following table may be increased or decreased to meet the requirements of a particular mix:

	LEVEL	BASED ON WEIGHT OF
Devils Food Cake	0.0125-0.020%	Dry Mix White Cake
White Cake	0.015-0.035%	Dry Mix Yellow Cake
Yellow Cake	0.035-0.06%	Dry Mix

REFERENCES:

1. Definition of Standards of Identity for Bakery Products, Code of Federal Regulations. Title 21, Section 17.1 (a)(b)(iii), April 1, 1973.
2. Herz, K.O., Staling of Bread – A Review. Food Technology 19, 1828 (1965).
3. Melver, R.G., Axford, D.W.E., Colwell, K.H., and Elton, G.A.H., Kinetic Study of Retrogradation of Gelatinized Starch, J. Sci. Food Agri. 19, 560 (1968).
4. Reed, G., Enzyme Supplementation in Baking. Bakers Dig. 38, 66 (1964).
5. Silberstein, O., Heat Stable Bacterial Alpha Amylase in Baking. Bakers Digest 38, 66 (1964).
6. Waldt, L.M., Enzymes in Baking. Wallerstein Lab. Comm. 32, 39 (1969).
7. Waldt, L.M. and Mahoney, R.D. Antifirming of White Bread by Application of Heat Stable Bacterial Alpha Amylase. Cereal Sci. Today 12, 358 (1967).

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