

# The Story of Yeast

## Yeast in History

Man used yeast before he knew how to write. Hieroglyphics suggest that the ancient Egyptian civilizations were using living yeast and the process of fermentation to cause their bread to rise over 5,000 years ago. Of course, they didn't know what was responsible for the leavening process, and probably looked upon the chemical action of yeast as a mysterious and unreal phenomenon.

Leaven, mentioned in the Bible, was a soft, dough-type medium kept from one bread baking session to another. A small portion of this dough was used to start or leaven each new lot of bread dough.

It is believed that since early times, leavening mixtures for bread making were formed by natural contaminants in flour such as wild yeast and lactobacilli, organisms also present in milk.

## Yeast Today

Centuries later, scientific research revealed that yeast is actually a tiny microorganism, visible only with a microscope. The chemical action and growth of yeast that causes dough to rise then became apparent.

## What Is Yeast?

Yeast is a tiny form of fungi scientists refer to as "microorganisms". They are egg-shaped cells that can only be seen with a microscope. It takes 20,000,000,000 (twenty billion) yeast cells to weigh one gram or 1/28 of an ounce.

### A tiny organism with a long name

The scientific name for one species of yeast is *SACCHAROMYCES CEREVISIAE*, or *sugar-eating fungus*. This name is derived from the Latin word "*cerevisiae*", which means "brewer". A very long name for such a tiny organism! This strain of yeast is very strong and capable of fermentation, the process that causes bread dough to rise.

### A fungus with a sweet tooth

Yeast cells digest food to obtain energy for growth. Their favorite food is sugar in its various forms: sucrose (beet or cane sugar), fructose and glucose (found in honey, molasses, maple syrup and fruit), and maltose (derived from starch in flour).

The process, alcoholic fermentation, produces useful end products, carbon dioxide and ethyl alcohol, which are released by the yeast cells into the surrounding liquid. This is how alcoholic drinks are produced from starch containing flours. For example, barley flour is used for making beer and wheat, corn and other grains are used for making whiskey.



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### **Fermentation in nature**

Fermentation occurs naturally in nature. For instance, many berries break open in late fall when they are overripe and full of sugar. Natural yeast organisms, so small they cannot be seen with the naked eye, lodge on the surface of these berries, which then become fermented and alcoholic.

### **Wine and bread making**

In commercial fermentation of grape juice for the production of wine, the carbon dioxide gas escapes from the solution. Evidence of gas can be seen in the heavy foam caps in fermenting wine tanks.

In bread baking, when yeast ferments the sugars available from the flour and from added sugar, the carbon dioxide gas cannot escape because the dough is elastic and stretchable. As a result of this expanding gas, the dough inflates. Thus, the term “yeast-leavened breads” was added to the vocabulary of the world of baking.

## **Types of Yeast**

When you hear the word “yeast”, what do you think of? No doubt you think of the type of yeast used in baking breads.

However, through the selection of strains and development of propagation techniques, more specific applications of yeast are now being found in many different industries, including brewing, malting, farming (animal feeds), pharmaceuticals and dietetics.



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## What is Baker's Yeast?

Baker's yeast is the type of yeast used in home and commercial bread baking. It is widely available in a number of forms, including Compressed Yeast, Active Dry Yeast and Quick-Rise™ Yeast.

### **Baker's Compressed Yeast**

This yeast is sold to the commercial and retail baking industry throughout the United States. It comes in one pound and five pound cakes and crumbled fifty pound bags. In order to achieve the solid formulation, "cream yeast" is pumped into presses where the excess water is removed. Once pressed, the resulting "cake yeast" is transferred to mixers, to assure uniformity, and then to extruders where the proper lengths and weights are cut. After the cakes are wrapped or bagged, they are stored in refrigerated rooms to await shipment.

Compressed Yeast is also called "wet yeast" or "fresh yeast". It is traditionally sold to consumers in two sizes: 2 ounce and 8 ounce blocks. The yeast is characterized by a high moisture content (about 70%). It is perishable and should be stored under refrigeration at all times. The shelf life is about 8 weeks from packaging.

### **Active Dry Yeast**

This yeast is processed one step further than Compressed Yeast. It is extruded into noodle form, loaded onto a conveyor belt and passed through a series of drying chambers where warm air is blown through the yeast. The yeast emerges with a moisture content of about 8% as compared to 70% moisture in Compressed Yeast. Due to the low moisture content, the yeast is in a semi-dormant state. Therefore, it can stand long periods of exposure with little effect on its ultimate baking activity. The packages are nitrogen flushed to extend the shelf life which is about one year from packaging. This yeast is sold in a 3-pack strip and a 4-ounce jar.

### **Quick-Rise™ Yeast**

This is a high-activity yeast strain created by protoplast fusion, the scientific technique of combining two separate yeast strains into a superior single strain. The manufacturing process is the same as for Active Dry Yeast, except that ascorbic acid is added as a dough conditioner or enhancer. It is also available in nitrogen flushed 3-strip packages and 4-ounce jars.



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## Ingredients Affecting Fermentation

### FLOUR

White or whole grain flours may be used for making yeast breads. When mixed with liquid and kneaded, flour develops enough gluten to support the carbon dioxide produced by the yeast. Gluten is the elastic substance formed when the protein of flour is exposed to liquids. Kneading develops the gluten, making it stronger so it can hold in the gases formed by the action of yeast. The gluten then stretches, trapping the bubbles and building the framework of the bread.

### FAT

Fats such as butter, margarine, shortening, oils and cheese are used in breads to add tenderness, moisture and flavor. They also make the gluten strands slippery so the yeast gases can expand easier.

### LIQUIDS

Water and milk are the most commonly used liquids in breads. Breads made with water only will have a more open texture, a more wheaty flavor and a crispier crust. Milk creates breads which are richer and have a velvety texture; crusts are softer and will brown more quickly due to the sugar and butterfat in milk.

### SUGAR

Sugar provides food for the yeast to grow, adds flavor and helps in the browning of the crust. However, if the concentration is too high, more yeast or longer proofing times may be required.

### SALT

Salt controls the speed at which the dough rises by reducing the osmotic pressure of the dough and controlling the gasses power of the yeast. Salt also strengthens the structure of the dough and adds the necessary flavor to a baked product.

**NOTE: Bread flavor is formed in the crust as it reaches a temperature of 302° to 356°F while the internal bread temperature does not exceed 210°F. The higher temperature causes the sugar in the dough to caramelize, creating a fruity or winy odor. Removal of the crust too soon after baking prevents the crumb from absorbing the crust flavor, causing it to taste different.**



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## Temperature Requirements of Yeast

Type of Baker's Yeast	Yeast Dissolved Directly in Liquids	Yeast Mixed First with Flour***
Compressed Yeast	80 - 90°F	-----
Active Dry Yeast	110 - 115°F	120 - 130°F
Quick-Rise™ Yeast	110 - 115°F	120 - 130°F

\*\*\* *Because the yeast is surrounded by flour, it is able to tolerate higher liquid temperatures.*

### What is Nutritional Yeast?

Nutritional Yeast is powdered yeast without leavening power, marketed for its protein and vitamin content. This type of yeast is available in both powder and pill form.

#### How nutritional yeast is made

“Cream yeast” is heated by means of a heat exchanger and held at pasteurization temperatures for a period long enough to kill the yeast. During this holding period, all necessary vitamins are added to meet the requirements of the specific type of nutritional yeast produced.

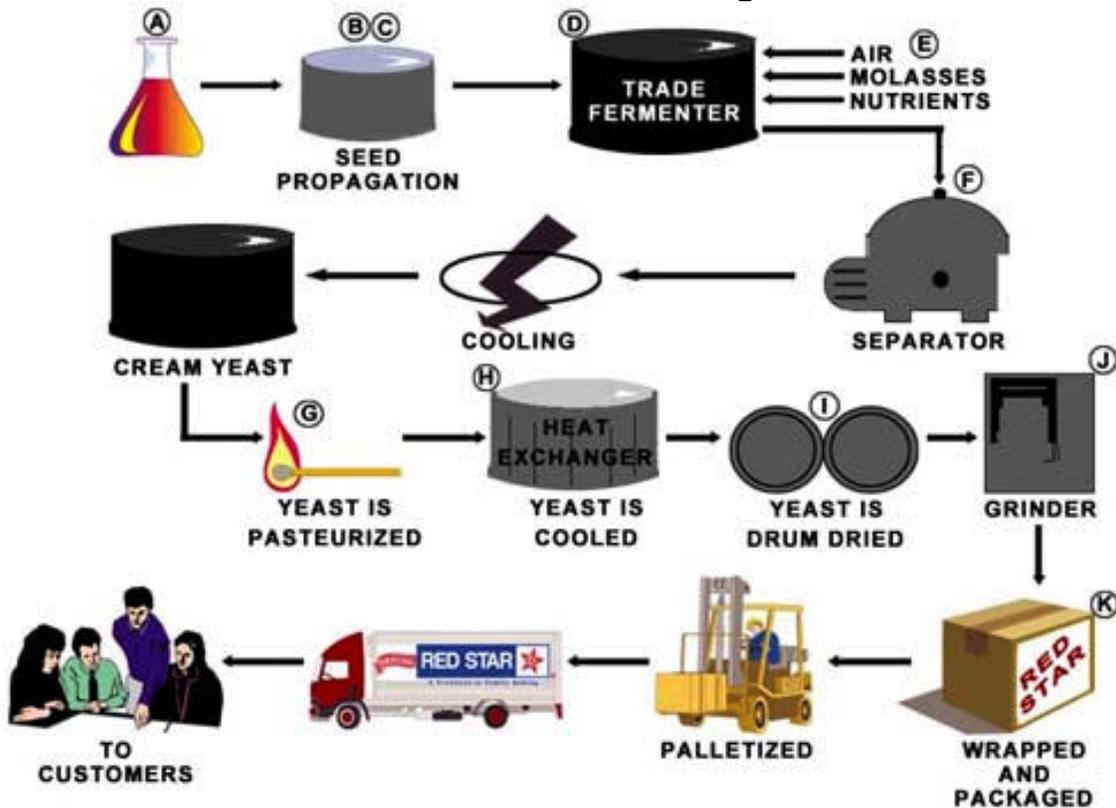
The yeast is then drum dried before it is ground and shipped to consumers. The drying process assures that all the cells are killed in order for the full nutritional benefits to be available.



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## The Basic Nutritional Yeast Making Process



- A) "Seed yeast" is grown in small flasks
- B) "Seed yeast" is transferred to 1,000 gallon tanks for fermentation (becomes "stock yeast").
- C) Alcohol from fermentation separated from "stock yeast"
- D) "Stock yeast" moved to refrigerated tanks ("Trade Fermenter") for fermentation cultivation
- E) Sterilized molasses, air and nutrients are added to "stock yeast"
- F) When yeast is ready to be harvested, fermented yeast liquid is passed through a "Separator" to produce "cream yeast"
- G) "Cream yeast" is heated and pasteurized, necessary vitamins are added
- H) Vitamin-enhanced "cream yeast" is cooled
- I) "Cream yeast" is drum dried
- J) "Cream yeast" is put through a grinder to produce a fine powder
- K) Nutritional yeast is packaged and ready for shipping

## What is Brewer's Yeast?

Brewer's Yeast is a dried, inactive yeast that has no fermenting power. It is sold for its nutritional qualities as it is very high in at least 10 separate B-vitamin factors, including:

**Thiamine**  
**Riboflavin**  
**Niacin**  
**Pyridoxine**  
**Pantothenic Acid**  
**Biotin**  
**Choline**  
**Inositol**  
**Folic Acid**  
**Paraminobenzoic Acid**

Brewer's yeast is a by-product of the brewing industry. After 5-10 succeeding beer fermentations, the yeast, due to increasing contamination, loses its viability and activity and is no longer acceptable for making beer. The yeast then becomes surplus and can be used for the production of food flavors, feed formulations or as nutritional yeast food.

Over the years, the term "brewer's yeast" has become generic. Primary grown baker's yeast (not a by-product of the same strain of yeast used by bakers to make bread) is often sold as brewer's yeast because the term is familiar to the consumer. The processing and drying of this yeast is carefully controlled so it remains inactive, making it easily digestible and yielding valuable amounts of B-complex vitamins and protein for assimilation.

Another form of brewer's yeast is labeled as "*DEBITTERED Brewer's Yeast*", due to neutralization of the bitter flavor of hops. This form of yeast is almost always certain to be brewer's yeast. However, due to a lack of standards governing this particular label, product packaging may claim to contain "brewer's yeast" and actually contain inactive baker's yeast.



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