

## **FACTSHEET No. 7**

# **HOW BREAD IS MADE**

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## ***INGREDIENTS***

The principles of baking bread have been established for hundreds of years. The basic ingredients are flour, yeast, salt and water. Bread Improvers (flour treatment agents), usually Vitamin C (ascorbic acid), are used in commercial production.

### **■ *Flour***

Wheat is grown in many parts of the world. However, flour made from `hard` wheats such as those produced in North America is higher in protein/gluten. Hard and soft wheats in milling terms are equivalent to strong and weak flours in baking.

Wheat flour is the key ingredient in most breads. Flour quality is particularly important in breadmaking as the quality of the flour will have a significant impact on the finished product.

When flour is moistened and stirred, beaten or kneaded, gluten develops to give dough `stretch`. The elastic framework of gluten holds the gas produced by the fermentation action of yeast.

In a year of good harvest a bread grist may consist of 80% of home grown wheat. This trend is likely to continue with advances in wheat breeding and technology. However, home grown wheat is not always strong enough to be used in all varieties of bread and baked products and there is no likelihood at the moment of this country being able to do without some imported wheat for breadmaking. Currently about 800,000 – 1,000,000 tonnes of wheat is imported for breadmaking, mostly from North America.

### ■ *Yeast*

Yeast requires moisture, food and warmth for growth. When these requirements are satisfied, the yeast grows. Its function in breadmaking is to:

- produce carbon dioxide gas to enable the dough to rise
- form the cellular network found in bread crumb
- give bread its characteristic aroma.

### ■ *Salt*

Salt is an essential ingredient in bread. It is used in very small amounts to give bread flavour. It also helps to control fermentation to produce bread of good volume and texture.

### ■ *Water*

Water is used to produce the dough. It is important that the water is the correct temperature and quantity when making bread, because it affects the dispersal of the other ingredients.

### ■ *Fat*

Vegetable fat is used in very small quantities; it helps to keep the bread soft and also helps the dough pass more easily through the production process.

### ■ *Bread Improver*

Vitamin C (ascorbic acid) is used to strengthen the dough and help it rise. It has a beneficial effect on the volume, crumb structure and softness of the bread.

### ■ *Preservatives*

Preservatives, such as acetic acid (vinegar), are often used in commercial baking to ensure the freshness of the product and prevent staling.

## ***UK LEGISLATION***

### ■ *Bread Weights*

By law bread in the UK has to be produced in multiples of 400g. (except for breads and rolls weighing less than 300g.). Therefore most loaves of bread weigh either 800g. (large) or 400g. (small).

### ■ *Bread and Flour Regulations*

The Bread and Flour Regulations require that flour should contain not less than 0.24 mg. thiamin (vitamin B1), 1.60mg. nicotinic acid and 1.65mg. of iron per 100g. of flour. These amounts are found naturally in wholemeal flour. White and brown flours must be fortified to restore their nutritional value to the required level.

In addition calcium carbonate, at a level of not less than 235mg. and not more than 390mg. per 100g. of flour, is added to all flours except wholemeal and certain self-raising varieties.

This ensures the high nutritional value of all bread, whether it is white, brown or wholemeal.

## ***PRODUCTION METHODS***

There are two main methods of making bread:

- **Bulk Fermentation Process (BFP)**
  - **Chorleywood Bread Process (CBP)**
- **BFP** is a traditional method. Ingredients are mixed together to form a dough and left to ferment for up to three hours. During fermentation the dough changes from a short dense mass into an elastic dough. The time taken to reach this state largely depends on the amount of yeast and the dough temperature.
- **CBP** The modern commercial process used in large bakeries is known as the **Chorleywood Bread Process** and was developed in 1961 by the Flour Milling and Baking Research Association at Chorleywood. This method produces bread and other fermented bakery goods without the need to ferment the dough in bulk. Dough development in **CBP** is achieved during high speed mixing by intense mechanical working of the dough in a few minutes. Not only does this save considerable time (which helps keep down the cost), it also produces bread which is better in respect of volume, colour and keeping qualities. **CBP** is now by far the most common method used throughout all sectors of the bread baking industry.

**CBP** allows the use of a much higher proportion of flour made from British wheat. This helps to reduce our dependence on hard wheat imported from countries outside the European Community which attract a high levy under the Common Agricultural Policy. Premium and wholemeal breads require a much higher proportion of flour milled from hard wheat and are consequently more expensive to produce.

*Note: In 1995 The Flour Milling & Baking Research Association merged with the Campden Food and Drink Research Association to form the **Campden & Chorleywood Food Research Association**.*

## ***THE CHORLEYWOOD BREAD PROCESS***

The **CBP** method of making bread cannot be reproduced in a normal classroom or kitchen because of the requirement for a high speed mixer. Colleges providing specialist bakery courses will have the right equipment. A project in partnership with a commercial bakery may also be possible. A typical recipe using **CBP** would be:

### ***Recipe***

Note: % ingredients are based upon 100% flour weight.

Flour	100.0
Yeast	2.0

Salt	2.0
Water	60.5
CBP improver	1.0*

Any bread recipe can be converted for **CBP** by including an improver at the recommended level. Compared with bulk fermentation doughs it is usual to increase the yeast level to maintain normal proof time and increase water to give dough of the correct consistency.

The level of improver varies for different speciality breads; advice must be taken from the improver supplier to establish the correct level.

**Note: Most commercial composite bread improvers contain active ingredients such as enzymes which require careful storage and handling - Health and Safety procedures must be followed.**

\*Hard fat is essential for **CBP** and is sometimes added as part of the improver.

### ***Method***

- All ingredients are pumped from large storage bins or silos into the dough mixers automatically. The equipment is controlled by computer. The dough is mixed intensely for about three minutes in a high speed mixer in batches of around 300 kilos. The temperature of the dough has to be carefully controlled at 28°C so that the yeast can grow and the dough become elastic.
- When mixing is complete the large mass of dough is tipped into a divider. It is then divided into individual pieces and shaped into a ball. The weight of each piece of dough is very important to ensure that the finished product complies with Weights and Measures Regulations.
- The dough pieces are allowed to `recover` for about eight minutes in a conveyor prover. This is the first or intermediate proving stage. Each piece of dough is then shaped and moulded and placed in a tin, four pieces to a tin for a loaf of bread. The texture and size of the doughpiece is automatically controlled. The dough then travels through the final prover which allows the dough to rise gently for about one hour in strictly controlled temperature and humidity conditions. It is then ready for baking.
- The bread is baked for about 20 minutes at 200°C. The loaves then go into a cooler. Cooling is usually done under carefully controlled conditions to ensure correct temperature, humidity and time. This is very important for quality. The cooling stage lasts for about two hours which enables the loaves to be sliced easily. The bread is then wrapped and ready for despatch.

## **ASSIGNMENT - MAKING A LOAF**

### **MAKE A LOAF OF WHITE BREAD USING THE BULK FERMENTATION PROCESS**

#### **■ Process**

The bulk fermentation process is suitable for baking in laboratory, kitchen or in small bakeries.

#### **■ Recipe**

Note: % ingredients are based upon 100% flour weight

Strong white breadmaking flour	100
Yeast	2
Salt	2
Water	58 (approximately)
Fat	1

#### **Optional Ingredients**

- Soya flour (0.5 to 1%), will improve crust, colour, volume and softness
- Malt flour (0.2%), will improve crust colour, volume and softness
- Skimmed milk powder (2%) will improve crust colour and taste
- Ascorbic acid (vitamin C) to give good crumb structure, volume and softness
- Extra fat will give a tender crust and softer crumb.

#### **■ Method**

##### **Mixing**

Mix the dough in a single or twin arm, low speed or spiral mixer. Adjust water temperature to give a final dough temperature of 28°C.

##### **To calculate water temperature:**

Double the required Dough Temperature (ie. 28°C x 2)

Minus the Flour Temperature = Water Temperature.

If no suitable mixer is available mixing can be done by hand.

##### **Fermentation**

Cover the dough to prevent skinning (forming a crust); keep in a warm place for 1 hour. During fermentation the dough changes from a short dense mass into an extensible, elastic dough, capable of holding gas.

The time the dough takes to reach the desired stage of development depends on the yeast level and dough temperature and must be carefully controlled. Typically, bulk fermentation times of 1 hour are used in small bakeries and 3 hours in larger bakeries.

### **Dividing**

Divide the dough into lumps. Normal dividing weights are 920g for a finished loaf weighing 800g and 460g for 400g bread.

### **Rounding**

Give a thorough first mould (form into a ball), knocking back or expelling large gas bubbles to create small cells. This is important as the bread crumb cell structure is created during the moulding stages.

### **1<sup>st</sup> (intermediate) Proof**

Allow 10-15 minutes, depending on the bread variety being produced. Keep covered with a polythene sheet or cloth (eg. a clean tea towel) to prevent skinning.

### **Moulding**

Sheet thinly to expel most of the gas for bread with a regular, small cell structure, more gentle moulding for bread with an open, random structure. The shape of the final bread will determine the exact process, ie. sausage, ball, etc.

### **Final Proof**

At 43°C and 80% humidity for about 50 minutes.

### **Baking**

At 235°C for 25-40 minutes depending on loaf size.

### **■ *Faults that may occur:***

- Over-fermented dough will result in bread with a pale crust colour and the crumb may be weak and crumbly.
- If the yeast has fermented all the available food, the bread will lack volume and springiness.
- Under-fermentation results in bread with high crust colour, small volume and dense, firm crumb of poor colour.

