

BREAD or PAIN

HISTORY

The invention of leavened bread is attributed to the Egyptians who cooked flat cakes made of millet & barley on heated stones & might have discovered fermentation by chance, with a piece of dough which had become sour. At the time of the Exodus, the Hebrews did not take with them any leaven, hence the tradition of unleavened bread to commemorate the crossing of the red sea. The Greeks cooked loaves made of rye or oats, or sometimes wheat, on a grid in a kind of oven. The Romans cooked their bread in household ovens, made of brick & earth & often flavoured it with the seeds of poppy, fennel or cumin or with parsley. From Italy, the use of bread spreads through out the Roman Empire. The Gauls kneaded barley beer into dough & obtained a well raised bread of good quality.

It was in the Middle Ages that the bakery trade began to develop, from this time, bread became very varied & many different kinds were produced. This included the hall bread, for distinguished guests, hulled bread (made from bran), intended for servants, whole meal bread, with a well cooked crust, and kept for making bread crumbs & trencher breads used as plates for cutting up meat. Soft or queen bread was enriched with milk & egg yolk, German wheat bread had a very hard crust, Gonesse & Melun loaves were supplied for a long time to the best bakeries of Paris & variegated bread was made of alternate layers brown & white bread.

In the 17th century a new method of fermentation was developed, using milk, salt & beer yeast to manufacture finer loaves made of long moulds. Gentilly, Segovia, Bread A L'esprit, Bread A L'merechale & horned bread. For a long time, the quality of bread dependent on the flour used & therefore on its colour. White bread or the rich, lack bread for the poor. In 1840, Viennese bread was introduced into France by a man called Zang, secretary of the Australian Embassy in Paris. He created the first bakery using Viennese methods. Fine wheat flour was kneaded with milk & water to produce long loaves or rolls that become one of the classic French Breads.

GASTRONOMY & DIETETICS

The only food which, like wine, is present on the table from start to finish of the meal, bread constitutes the traditional accompaniment to all dishes. It is also the basic ingredients of sandwiches, canapes, toast, croutons, and bread crumbs. In addition to this it is used widely in the preparation of other dishes, notably soups, panadas, stuffings & forcemeats, timbales, charlottes & puddings.

Good bread must have a crisp crust & attractive golden colour & a soft crumb. Growing stale too quickly is a sign of bad quality are tasteless & insipid. A good quality bread can be kept for up to a fortnight in a box, preferably of wood. If it is cut it should be stored with the cut side against the wood, bread freezes well if it is hermetically packed.

Most bread should be served fresh but not hot. Rye bread, however, should be slightly stale & farmhouse loaves are best left until the day after they have been baked. Loaf should not be cut until just before service. The slice should not be too thin in order to retain all the flavour of the bread, baguettes & other long loaves should be cut in small sections. Bread is best served in a wicker or cane basket.

A daily intake of 300 gm of bread provides 125 gm of carbohydrate, 25 gm protein, about 2 gm of fat & mineral salts (calcium, phosphorus, Mg & K), it gives 750 calories, 1/3 of the normal daily intake, but the input varies according to the nature of the flour. Nutritionists agree that good bread constitutes an indispensable basic food.

INGREDIENTS OF BREAD MAKING

Raising agents -

Yeast is a living plant available fresh or dried. When mixed with flour & liquid it gives off carbon dioxide, which expands, making the dough rise.

Bicarbonate of soda is the main raising agent for quick breads. When added to liquid & heated, it gives off carbon dioxide which expands & makes the dough rise.

Cream of tartar is often used with bicarbonate of soda as it reacts with it to help to neutralize the slightly soapy taste of bicarbonate of soda.

Baking powder is a readymade mixture of bicarbonate of soda & acid (often cream of tartar), which produces carbon dioxide when it comes into contact with moisture. It is also used for quick breads.

YEAST

This is the ingredient that makes bread rise. You can buy it either fresh or dried and both work well. Both fresh and dried yeast should be stored properly in a cool place. Remember also that the more fat and sugar dough contains, the more yeast you are going to need. It is a microscopic single celled plant, and there are many different varieties all around us in the air and on the leaves and fruit of plants. In the right conditions yeast will reproduce rapidly and produce ferments, which are capable of breaking down starch and sugar converting them in to carbon dioxide and alcohol. It is the production of carbon dioxide gas in bread making which makes the dough rise, while the by products that are formed during the working of the yeast ferments give the bread its special flavour. A different types of yeast is used in beer and wine making. This has a higher alcohol tolerance than other yeast.

Carbohydrates, air, water and warmth, in suitable proportion, are all necessary for the rapid growth of yeast. A certain amount of sugar enables it to grow quickly, though too much shrinks the cells and prevents budding. Too much salt and fat also slow down the budding process. All liquids used for yeast mixtures should be lukewarm, as cold retards the growth, and excess heat kills the yeast plant.

Yeast is a source of the 'B' group vitamins, and is sometimes prescribed medically, either in its natural form or as one of the manufactured yeast extracts.

Types of yeasts :-

1. Baker's Yeast :- It is the type used for bread making. It is available fresh or as dried granules. Fresh yeast will keep only for two or three days, after which it crumble- easily, becomes darker in colour and has a stale smell. It is best to buy just enough for immediate use. It can, however, be stored in the freezer for upto a year.

There are different varieties of dry yeast granules and the manufacture's instruction should be followed. When using dry yeast in a recipe specifying fresh using specifying yeast, allow half the quantity of the dried type. To add it to other ingredients in bread making, dissolve the dried yeast with 5ml. (1 tsp) sugar in some of the liquid taken from the amount stated in the recipe. Leaving a warm place for above 10 mins, or until frothy, then mix with the dry ingredients and the remaining liquid to make a dough. Easy blend dried yeast can be mixed with the dry ingredients without adding to liquid first.

2. Brewer's Yeast :- It is used for brewing. There are two types in generally used. Top fermenting yeast works on the surface of the vat and is used for making beer; bottom-fermenting yeast is used for brewing lager.

Wine yeasts come in powder, granular or tablet form as well as liquid yeast cultures.

FLOUR

Wheat is either hard or soft depending on its gluten content. When hard wheat is milled it produces a strong flour, rich in protein containing a sticky rubber like substances called gluten. In bread making, the gluten starches like elastic & as it is heated, it expands & traps in the dough the carbon dioxide released by the yeast. The gluten then sets & forms the frame of the bread. It is the gluten content in the strong flour that gives volume & open texture of bread & best results are obtained by using this flour.

When soft wheat is milled they produce flour with different gluten properties. More suited to the making of cakes & pastries where a smaller rise & closer, finer texture are required. This ordinary soft flour which is either plain or self raising can be used for bread but it will give a smaller rise & colour crumby texture with a pale, hard crust & a disappointing result. Self-raising flour can be used for recipes in quick breads.

Generally bread made with whole meal flour has a closer texture & a stronger more distinctive taste than white bread.

Types of Wheat flour :-

1. Whole meal (Whole what) Flour :- It contains 100% of the wheat grain. However much of the whole meal flour sold is produced by the steel roller process which automatically remove the bran & germ to the milled flour after processing, which has already destroyed many of the nutrients they contain. Strong, plain & self-raising types of whole meal flour are available.

2. Brown (Wheat meal) Flour :- It contains 80 – 90% of wheat and it is more absorbent than white flour. It is available in strong, plain and self-raising forms. Self-raising.

3. White Flour :- It contains 72 -- 74% of the wheat grain. The bran and wheat germ, which give whole meal & brown flours, their brown colour, are removed, resulting in the white flour, which is used to make fine textured white bread. Much white bread is bleached chemically. White flour is available in strong, plain & self-raising forms. Self-raising flour has a raising agent already blended with it.

4. Stone ground Flour :- Takes its name from the specific process of grinding used to produce it. The whole-wheat grain is ground between two stones, one of which remains fixed while the other moves over it with the grain in between. The process hits the flour slightly, giving it slightly roasted, nutty flavour. Both whole meal & brown flours can be stone ground.

5. Granary Style Flour :- It is strong ground flour with added malted wheat flakes giving a nutty flavour. It is in fact the brand name of a particular type of flour produced by the Rank Hovis McDougall plc., but the name is often used to describe other granary style flour and bread made from them.

6. Organic Flour :- It is produced from wheat grown to strict standards of organic husbandry, in soil, which has not been treated with artificial fertilizers for at least 2 years. No chemical pesticides, herbicides or artificial fertilizers are used and the flour contains no additives. Both white and whole meal type of organic flours are available.

Food value of Wheat Flour :-

Flour is a cheap & valuable food. It supplies energy, protein, calcium, iron & vitamins of the 'B' group. White flour has only about half the minerals & 'B' vitamins contained in whole meal flour, although it has much the same amount of protein and energy value. White bread contains no fibre, since the bran has been removed, and for this reason, many people prefer to use whole meal flour & to eat whole meal bread.

Gluten content or strength of flour :-

Wheat is said to be either hard or soft, depending on its gluten content. When hard wheat is milled it produces strong flour, rich in protein, containing a sticky, and rubber like substance called gluten. In bread making, the gluten stretches like elastic and, as it is heated, it expands and traps in the dough the carbon dioxide released by the yeast. The gluten then sets and forms the frame of the bread.

When soft wheat's are milled they produce flour with different gluten properties, more suited to the making of cakes or pastries where a smaller rise and closer, fine texture are required.

SALT

It improves the flavour of bread. It should be measured accurately, as too little causes the dough to rise too quickly & too much kill the yeast & gives the bread an uneven texture. Salt is used in the proportion of 5-10 ml (1-2 tsp) to 450 gm (1 lb) of flour. Low sodium salt also is used.

FAT

Adding fat to the dough enriches it & gives a moist, close textured loaf with a soft crust. It also helps keep the bread fresh & soft for longer. It is often rubbed into the flour & salt or if a large quantity is used, it is melted & added with the liquid ingredients. If using margarine, block margarine is better than soft tub as it is easier to rub in. oil may be used instead of fat.

LIQUID

Water is suitable for plain bread, producing a loaf with an even texture & crisp crust. Milk & water or milk alone will give a softer golden crust & a loaf will stay softer & fresher for a longer period.

The amount of liquid used will vary according to the absorbency of the flour. Too much will give the bread a spongy & open texture. Whole meal & brown flour are usually more absorbent than white.

The liquid is generally added to the yeast at a tepid temperature, that is 43° c (110° f). Boiling water will kill the yeast.

GLAZES & FINISHES

If a crusty finish is desired, bread or rolls can be brushed before baking with a glaze made by dissolving 10 ml salt in 30 ml water.

For a shiny finish, the surface should be brushed with beaten eggs or beaten egg & milk.

For a soft finish dust the bread or rolls with flour before baking. Some breads & yeast buns are glazed after baking to give them a sticky finish. To do this, brush the bread with warmed honey or a syrup made by dissolving 30 ml sugar in 30 ml water & bring it to the boil.

There are many ways of adding interest variety & extra fibre & vitamins to bread & rolls. After glazing & before baking, lightly sprinkle the surface with one of the following:

- 1) Poppy, caraway, celery or fennel seeds.
- 2) Sesame seeds — particularly good sprinkled on to the soft baps used with hamburgers.
- 3) Cracked wheat, barley or wheat flakes, sprinkled on top of whole meal breads or baps.

MAKING BREAD

Mixing the dough warmed ingredients & bowl will help to speed up the first rising process. Measure all the ingredients carefully into large bowl. Add the yeast liquid & mixed with the dry ingredients, using a wooden spoon or fork, until blended. Work the dough, using your hands, until the mixture is smooth & leaves the sides of the bowl clean.

KNEADING THE DOUGH

Kneading is essential to strengthen the gluteus in the flour, thus making the dough elastic in texture & enabling it to rise more easily.

Turn the dough on to the floured work surface & knead the dough by folding it towards you & quickly & firmly pushing down & away from you with the heel of the hand. Give the dough a quarter turn & continue kneading for 10 minutes, until it is firm, elastic & no longer sticky.

Using a dough hook if you have a mixture with a dough hook attachment, it can take the hard work out of kneading. Follow manufacture instructions, working with small amounts of dough is more successful than attempting a large batch at once. Place the yeast dissolved in liquid in the bowl, add the dry ingredients, and begin at the lowest speed 4 minute to form the dough. Increase the speed the recommended time.

Using a food processor also takes the hard work out of yeast mixtures. Follow the manufacture's facture's instructions on quantities as it is important that the bowl is not overfilled. You may need to halve the recipe & prepare the two batches of dough.

RAISING

The knead dough is now ready for rising. Unless otherwise stated in the recipe, place the dough in a bowl & cover with a clean tea towel. This will prevent a skin forming during rising. Rising time vary with temperature. Allow 1.5 to 2 hours at room temperature for the dough should have doubled in size & should spring back when gently pressed with a lightly floured finger.

Good results are obtained by allowing the covered dough to rise in the refrigerator overnight or for up to 24 hours. The dough must be allowed to return to room temperature before it is shaped.

The dough can be made to rise in about 45-60 minutes in a warm place such as an airing cupboard or above a warm cooker.

PREPARING TINS

While the dough is rising, grease the tins or baking sheets. Where reference is made to a 450 gm loaf tin, capacity 90 ml, the approximate size to use in 16.5 X 10.5 cm top measurements & for 900 gm loaf tin, capacity 1.7 liters use 1 with 20X13 cm top measurements.

KNOCKING BACK

The best texture is obtained by kneading the dough for a second time after rising. Turn the risen dough onto a lightly floured work surface & knead for 2 to 3 minutes to knock out any large bubbles & ensure an even texture. The dough is then shaped as required, placed in the prepared tins or on baking sheets, covered with a clean tea towel & left in a warm place to rise again.

PROVING OR SECOND RISE

This is the last process before baking. The shaped dough should be allowed to prove that is left at room temperature until it has doubled in size & will spring back when lightly pressed with a floured finger. After proving the dough is ready for glazing & baking.

BAKING

Basic breads are baked in the oven at 230^oc (450^o f), mark & when cooked, the bread should be well risen & golden brown & it should sound hollow when tapped underneath with the knuckles. Larger loaves may need to be turned out of the tin & returned to the oven upside down for the last 10 to 15 minutes of the cooking time to ensure they are cooked through. Allow to cool on wire racks.

TRADITIONAL BREAD & ROLL SHAPES

- 1) **BATON** - Shape the dough into a long roll with tapering ends, about 20.5 cm (8 inches) long.
- 2) **BLOOMER** - Flatten the dough & roll up like a Swiss roll. Tuck the ends under & place on a baking sheet. When proves to double its size, make diagonal slits on top with a sharp knife. Glaze the top with beaten egg or salt water before baking.
- 3) **COB** - Knead the dough into a ball by drawing the sides down & tucking them underneath to make a smooth top.
- 4) **COTTAGE** - Cut $\frac{1}{3}$ rd off the dough. Knead both pieces well & shaped into rounds, place the smaller round on top of the large one & place on a baking sheet. Make a hole down through the middle of both pieces using the handle of a wooden spoon. Glaze with salt water before baking.
- 5) **CROWN** - Divide the dough into 50 gm pieces. Knead shape into rounds & placed in a greased round sandwich tins. The crown is usually pulled apart into rolls when served.
- 6) **KNOTS** - Divide the dough into three, shape each piece into a thin roll & tie into a knot.
- 7) **LOAF** - Only fill the tin $\frac{2}{3}$ rd full for a perfect shape. Fold the dough in 3, smooth over the top & tuck in the ends, then place in the tin.
- 8) **PLAIT** - Divide the dough into 3 & shape into long rolls about 30.5 cm (12 inches) long. Pinch the ends together before baking, glaze with beaten egg & sprinkled with poppy seeds.
- 9) **RINGS** - Divide the dough into 3, shape each piece into a thin roll & bend it round to form a ring, dampen the ends & mould them together.
- 10) **ROUNDS** - Divide the dough into 3, place the pieces on a very lightly floured surface & roll each into a ball. To do this, to the hold hand flat almost at table level & move it round in a circular movement, gradually lifting the palm to get a good round shape.
- 11) **TIN** - Roll out the dough to an oblong & roll up like a Swiss roll. Tuck the ends under & place in the prepared tin. Before baking, score the top of the loaf with sharp knife if wished.
- 12) **TREFOIL** - Divide the dough into 3 & divide each piece into 3 smaller pieces. Roll each into a ball. Place the 3 balls grouped together on a baking sheet.
- 13) **TWIST** - Divide the dough into 3 & divide each piece into 2. Shape into thin rolls. Hold one end of the 2 pieces of dough together & twist. Dampen the ends & tuck under.

BREADS

1. **Brown or Wheat Meal Bread :-** There are many different types of brown bread on the market and many have added wheat germ or melted meal. The popular brands are usually made from branded flours, and are sold wrapped or sliced for convenience. These are very useful for the sandwich maker who is in a hurry. They can be bought in thin, medium and thick slices.
2. **Whole meal Loaves :-** Like the brown or wheat meal breads this variety can be bought almost anywhere. These loaves are coarser than brown or wheat meal ones and contain important fibres and nutrients essential to our- bodies.
3. **Germ Breads :-** These breads are baked from white or wheat meal flour with added wheat germ Hovis being about the best-known variety.
4. **Bran Loaves :-** These are made from either brown or white flour or whole meal flour with added bran. Nowadays, more people are conscious of the need to eat more bran in their diet for health and vitality. Bran makes bread high in fibre content and gives a very pleasing light texture.
5. **Granary Breads :-** This bread has a high fibre content and is made from specially formulated flours which are mixed with kibbled and whole grains. These loaves are normally bought unsliced and unwrapped, in both tin and cob varieties. The tin variety is best for sandwich making because of its shape.
6. **Soda Loaves :-** These loaves are eaten in great deal in Ireland. They are baked with either brown or white flour and are cooked with bicarbonate of soda or buttermilk instead of yeast.
7. **Barrel Loaves :-** This is an interesting shape to use for sandwich making as it has a number of close ridges all the way across the crust which makes it easy to cut. It is also known by other names in different parts of the country, such as Lodger's Loaf, Landlady's Loaf or Crinkled Musket.
8. **Bloomer Loaves :-** These are long, plumpish loaves, baton-shaped and have deep, diagonal slashes across the top. They are sometimes known also as twists.
9. **Batch Loaves :-** As the name suggest, these loaves are baked in batches, lose together in the oven in one wide tin so that their sides touch. When they are cooked they are then split apart so that they have no side crusts.
10. **Crusty Baton Loaves :-** This is a long, thick, baton shaped loaf, much thicker and wider than a French Stick. It usually has two slashes across the top crusts.

11. **French Stick :-** This is a long, thin loaf with blunt ends and a crusty top. It has a long slash down the center.
12. **Sandwich Loaves :-** These are most commonly used for sandwich making, as the name suggests, as they give even, square slices. They can be bought either brown or white, in thin, medium or thick slices, ready-wrapped or unsliced and sold under many brand names. They are large, standard loaves, baked in a tin.
13. **Split Tin Loaves :-** These are usually white, long and thin with a slash from end to end along the top of the crust.
14. **Baps & Rolls :-** These can be made from the same ingredients as used for bread making but made on a smaller scale. Baps and Rolls are often easier to handle than large loaves for sandwich making as they are easier to fill and to pack. You can use almost any type of filling including hot ones.
15. **Rye Bread :-** This is a very good for sandwich making with its rich, dark colour. It makes a pleasant contrast with colorful ingredients and is a boon for the diet conscious. Rye bread is made with a mixture of rye and wheat flours and often has a slightly sour taste about it, which, in fact, makes it rather delicate and unusual tasting bread. It is particularly good when eaten with smoked fish, cheese and salads. Rye bread keeps well and can be used when it is quite stale as it still retains its moisture. It should be cut into wafer-thin slices and can be used also to make canapes because of its cutting quality. Rye breads also freeze beautifully.
16. **Pitta Bread :-** This bread originally came from the eastern Mediterranean and has become very popular in this country in recent years. It can be bought in most supermarkets, either fresh or frozen. It can take almost any filling and makes a good, robust snack if filled with such things as hamburger, sausages, beans, bacon and eggs, coleslaw and mixed salads. The combinations are endless.

BREAD FAULTS

There are a number of factors which may be responsible for creating faults in bread. However; some of the major factors which adversely influence the quality of bread are as follows:

1. Inferior quality and inadequate quantity of gluten in the flour.
2. Poor or excessive diastasis activity.
3. Disproportionate quantities of raw material i.e imperfectly balanced formula.
4. Inferior quality of raw material specially yeast.
5. Incorrect time and temperature of fermentation.
6. Incorrect methods of manipulation of dough i.e knocking back, dividing and moulding.
7. Improper proofing conditions i.e time, temperature and humidity.
8. Improper baking conditions, i.e temperature, humidity and time.
9. Inadequate cooling of bread before packing.
10. Improper storage conditions.
11. A general lack of understanding of principles of hygiene on the part of baker.

A thorough knowledge about raw material and its functions, adequate understanding of bread making procedures, necessary control on timing, temperatures and humidity conditions at different stages of bread making and above all personal skill and experience of the baker goes a long way in avoiding faults in bread and also in finding out remedy, should any fault occur. A skilled baker should examine the bread carefully, and by reasoning, deductions, elimination, and if necessary, by experimentation, should be able to detect the cause of fault and subsequently find the solution.

The overall quality of bread is dependent on the degree of perfection of its various characteristics like volume, crust colour, flavour etc. These characteristics are influenced by various factors as follows:

Volume

Proper volume of bread is the outcome of adequate conditioning of gluten and sufficient gassing power of the dough at the time of baking. For many reasons as listed below, if these two conditions are not fulfilled the volume remains small.

1. Too tight a dough without commensurate adjustment in the yeast content and fermentation time.
2. Too little or excessive yeast content for the procedure followed.
3. Under fermentation of dough.
4. Too cold dough, or too cold temperature of fermentation room.
5. Crusting of dough at any stage of processing.
6. Excessive quantity of salt, sugar or fat in the formula.
7. Excessive temperature of the oven.
8. Under proofing of bread.
9. Lack of excessive diastasis activity in the flour.
10. High bran content in flour (ash content more than 0.5%)

11. Overuse of chemical bread improvers.
12. A badly over fermented dough.
13. Use of too weak or too strong flour.
14. Over mixed or under mixed dough.
15. Absence of fat in the dough.

Reasons for Excessive Volume in Bread

1. Over fermentation of dough. However, if the over fermentation is excessive, the volume may be small because the gluten will be excessively mellowed and not in a position to support the structure.
2. Too slack a dough.
3. Lack of temperature in the oven.
4. Lack of salt in the formula.
5. Excessive quantity of yeast.
6. Excessive proofing.
7. Excessive quantity of dough for the size of mould.
8. Loose moulding.

Crust Colour

Crust colour is controlled by the amount of sugar present in the dough at the time of baking, presuming that the bread is baked at right temperature. If for any reason, there is more activity of yeast, more sugar will be consumed by yeast and bread will have a light, pale brown colour as in the following cases;

1. Excessive fermentation time given to dough.
2. Lack of salt in the dough.
3. Too slack a dough.
4. Excessive yeast for the process used.
5. Too high a dough temperature.
6. Too high a temperature of fermentation room.
7. Lack of sugar in the formula.

Some other reasons which, although, do not enhance the yeast activity, they do reduce the crust colour such as; low diastasis capacity in the flour, crusting of bread during proofing and use of excessive dusting flour. Insufficient oven temperature will certainly cause lack of crust colour.

Too Dark Crust Colour

If more sugar is present in the dough at the time of baking, bread crust will acquire dark colour. Following are the likely reasons for this fault:

1. Excessive sugar in the formula.
2. Too much diastasis activity in the dough.
3. Young (under fermented or over mixed) dough.
4. Too high oven temperature.
5. High milk, or/and salt content in the formula.
6. Chilling of dough during fermentation or proofing.
7. Lack of humidity in the oven.

Exaggerated Break, Wild Break or Flying Tops

A smooth break-shred is a desirable quality of bread. If the gluten is not adequately conditioned during fermentation, the top crust, instead of rising gradually, will burst open under the pressure of expanding gas. Depending upon the degree of under fermentation, the bread will have exaggerated or wild break or flying top. Some other reasons for having wild break are; insufficient proofing of bread, excessive heat in the oven, lack of diastasis activity in flour, and lack of humidity in the proofing room or oven.

Lack of Bread Shred

If the dough is over fermented, the gluten will lose its resistance power and will have excessive stretchability. Such a condition of gluten will not produce any break-shred during baking operation. A bread having no break-shred is said to be having blind appearance. Some other reasons for the absence of break-shred are under matured dough, over proofing, extreme under proofing too high temperature in the oven, and very slack dough.

Holes and Tunnels in Bread

If for any reason, some gluten strands break, either during proofing or initial stage of baking, it has a chain reaction and neighboring gluten strands also continue breaking until the proteins are coagulated under the action of heat and

the structure of bread is set. The reasons for breaking of gluten strands could be as follows:

1. Too weak flour. Weak flour will not be able to hold expanding gas specially if there is excessive gassing due to high yeast content.
2. Too strong flour with high yeast content. Normally strong flours should be fermented for longer periods with lesser amounts of yeast. If the quantity of yeast is more and fermentation time is reduced, then there will be more gassing power in the dough but gluten will not be adequately conditioned resulting in its poor stretchability causing holes.
3. If the ingredients like fat, milk solids, salt, sugar, yeast are not mixed properly in the dough, the continuity of gluten strands will be broken wherever the lumps of these material are present.
4. If the oven sole is too hot, there will be faster set of structure on the lower surface of bread which is in contact of oven sole, while the inner part will rise as the heat penetrates in the bread creating holes in the bread.
5. If the dough is not knocked back at all or knocking back is not done thoroughly, the large gas cells present in the dough may also find their way into the bread specially if care is not taken during moulding operation to apply sufficient pressure to break the larger gas cells.
6. If excessive dusting flour is used at the time of moulding, this flour will be folded in the bread and will create elongated slits. Other reasons for creating holes in bread are: Too hard and granular fat, too little salt, Excessive use of oxidising agent (i.e potassium bromate etc.). Undermixed dough, slack dough, crusting of dough at any stage.

Cores and Seams

When the cut surface of crumb is gently pressed with finger tips, it is likely that entire surface may not be evenly soft and presence of occasional hard spots may be felt. These hard spots are known as cores, and are formed due to:

1. Uneven mixing of dough specially hand mixed dough.
2. Incorporation of bits of dough collected from machine bowl, or work-bench, after the bulk of dough has been set for fermentation.
3. Skinning of dough during bulk fermentation or intermediate proofing. This crust is folded into the bread and will show as hard core.

Very often a sandwich bread may show dense layers on the outer periphery of the crumb specially near the top crust. This happens because the expansion of dough (during baking) is restrained by the side walls or the cover of the bread mould. Due to the pressure from expanding gas, the outer structure of bread is formed into dense layers. If the cut surface of bread is observed, it could be clearly seen that the central part has a open soft structure while the outer periphery has very close and compact structure. These dense layers are known as Seams.

Reasons for having seams in bread are as follows:

1. Weight of dough more than the capacity of the mould.
2. Too hot or too cold bread mould; in both the cases the yeast activity will be checked at the point of contact with mould.
3. Careless handling of a fully expanded bread while loading the oven, or disturbing the bread in the oven before structure is set.

Condensation Marks

If the bread is not allowed to cool properly before packing, some of the water vapours will deposit in the crumb structure causing dark colour patches known as condensation marks. Bread should be thoroughly cooled before it is packed.

Rapid Drying (Staling) of Bread

If the gluten is not conditioned adequately, it cannot acquire the quality of moisture retention and bread will dry out fast. Under fermentation due to any reason whatsoever, will promote rapid drying out of crumb. Other reasons for rapid drying out of bread are as follows.

1. Baking in too cool oven, in which case the bread will take longer to bake with the resultant evaporation of more moisture.
2. If the dough temperature is too high there will be undesirable evaporation of moisture during fermentation as well as proofing stage. When the dough temperature is high, usually doughs are fermented for lesser time resulting in inadequate maturing of gluten which will not acquire moisture retention capacity. If fermentation time is not reduced then dough will have open structure which will cause rapid drying out of bread.
3. Too tight dough unless the fermentation time is adequately increased in order to allow proper mellowing of gluten.

4. Ingredients like salt, sugar, fat have moisture retention capacity. If these ingredients are not used in the formula at desirable level the resultant product will dry out faster.
5. Use of milk in the formula without making related changes in water and fat content.
6. Excessive use of mineral improvers will cause rapid drying out of bread.

Over Moist or Sticky Crumb

If flour is milled from sprouted wheat, it will have excessive diastasis capacity. When bread is made from such flour, there will be excessive formation of sugar and dextrin which imparts gumminess to the crumb of bread. Due to this gumminess, the normal amount of moisture will not be baked off leaving the crumb over moist. Presence of excessive sugar and dextrin will also hold moisture, making the crumb over moist. If bread is proofed in excessive humid condition or if bread is under baked then also crumb will be over moist. A crumb that is over moist, sticky and smells like rotten pineapple, denotes the presence of Rope disease.

Close Crumb

Milk has a tightening action on gluten and if it is used in the formula without compensating with enhanced quantity of yeast, water and fat, the bread will develop a very close crumb. In plain white bread, excessive quantity of fat will break down the crumb structure making it close and compact. Over use of potassium bromate or any other oxidising agent will tighten up the crumb. Some other reasons are: Use of hard water, mould too small for the weight of dough, young dough, under proofing, tight dough, and too high oven temperature.

Crumbliness of Crumb

When a dough is adequately fermented, the gluten strands develop elasticity and crumb also becomes elastic. If there is no elasticity and crumb also becomes elastic. If there is no elasticity in the crumb, the bread will not slice neatly and may break into fragments by the pressure of the slicer blades. This characteristic is known as crumbliness of the crumb. Such a crumb will also break while applying butter to the slice. Crumbliness is almost always related to the degree of fermentation given to the dough. Gluten of an under fermented dough will not be conditioned adequately to develop elasticity while the gluten of over fermented dough will be weakened to the extent that there is no elasticity left in it. Apart from the degree of fermentation, some other factors may also adversely affect the elastic nature of crumb such as;

1. Too slack dough
2. Too tight dough (without due amendments in yeast content and length of fermentation time)
3. Excessive use of fat
4. Excessive use of mineral improvers.
5. Low salt content of the dough
6. Poor quality of flour
7. Undermixed dough
8. Under baked bread
9. Over proofing of bread

Leathery Crust

The crust of bread should be tender and should easily break when pulled. However, at times, for various reasons, a crust becomes tough and leathery. This normally happens when a dough is under ripe or a strong flour is used without making due amendments in fermentation time. In both the cases, the gluten will not be sufficiently conditioned and will retain some of its toughness. Secondly, if, for any reason, the crust absorbs moisture unduly either during baking or after baking, it will acquire leatheriness. Excessive humidity in proofing room and oven should be avoided and bread should be thoroughly cooled before packing. Too slack a dough will produce leatheriness of crust because adequate amount of moisture will not be baked off and some of it will be absorbed by the crust causing the fault.

Runny or Sticky Doughs

It is rather difficult to process a sticky dough either by hand or by machine. A dough piece should have an all-round expansion during intermediate proofing. However; at times for various reasons, it will spread only horizontally rather than have an all-round expansion. Such doughs are known as runny or fluid. Bread made from such a dough will have sharp edges because due to excessive fluidity the dough will fill the corners of the mould. Bread will also have dark bottom and sides due to close contact of the dough with the mould. When a dough is adequately fermented, small gas cells are created in the dough. This is made possible because, during fermentation gluten acquires stretchability, and there is enough gas production to create cells under the framework of stretched gluten, as a result of which there is all-round expansion of dough. If the dough is not sufficiently fermented, there is neither sufficient gas production nor adequate mellowness in gluten and the dough tends to flatten out. Gluten of an over

fermented dough will be too mellow to have much strength to support an upward pressure of expanding gas and in that case too, dough will be runny.

A weak flour will produce runny dough because its gluten does not have sufficient strength to support the structure. If there is excessive diastasis action in the dough, the excessive sugar and dextrines produced in such case will make the dough runny and sticky. Freshly milled flour is also likely to produce runny and sticky dough unless some oxidizing agent is used in the formula.

Sourness

Pleasant flavour and taste, developed as a result of fermentation, are considered to be very desirable characteristics of bread. However; sourness in taste or flavour is not desirable. A strict control on the temperature of the dough and fermentation room as well as on the fermentation period will allow only as much acid production as is desirable for mellowing of gluten, and for developing the right strength of flavour in the product. However; if the dough temp. or the temp. of fermentation room is undesirably high (more than 85°F) or the period of fermentation is too long, the yeast will work itself out, but the acid producing bacteria will still remain active thereby increasing the acidity in dough and affecting the flavour and taste of the resultant bread. A bread, only slightly affected by rope (disease), will also have sour smell (inspite of proper fermentation condition) but this smell will be nauseating and entirely different from normal sourness which is caused by excessive fermentation.

Irregularity of Shape

While moulding bread by hand, an even pressure should be applied so that a moulded piece of dough has an even oblong appearance. Expansion during proofing of such a piece of dough will be even and the resultant bread will have regularity of shape. However; in case of loose moulding or moulding with uneven pressure, there will remain large air pockets in the folds causing irregularity of shape. In case of wood fired oven, normally, live coal is pushed in one corner and left there while baking operation is carried on. The side of bread facing live coal should be protected against fierce heat, either by covering the live coal or by covering the bread with some kind of protective shield such as a baking tray. If protection is not given, the shape of bread will become irregular due to uneven absorption of heat by bread. For the same reason, a small batch of bread should not be baked in a large oven without due care (such as keeping a bowl of water in the oven prior to baking). Bread should always be set in the oven at an even distance from, and parallel to, each other in order to ensure even absorption of heat by each unit of bread. A badly loaded oven will affect the regularity of shape.

Since hearth type products (like French bread, Vienna bread) are baked directly (without mould) on the hearth of the oven, their expansion is not guided by the side walls of the mould as in the case of pan bread. Such products should be docked or scored prior to baking, so that the expanding gas may escape through these openings without affecting the regularity of shape of the product. In case of insufficient or absence of docking, the expanding gas may create bulges at the weaker spots spoiling the shape of the product.

Blisters

If bread is proofed in excessive humidity, the moisture deposits on the surface of bread in the form of small droplets. Due to this increase in the moisture content, the gluten of the affected spot acquires more stretchability just as it will happen in the case of slack dough. Such spots form blisters under the pressure of expanding gas during baking operation. In case of moulding by machine, if the pressure board is adjusted too closely, the moulding will be too tight and some air bubbles will get entrapped on the surface under a very thin film of gluten. These air bubbles will expand during proofing as well as during baking causing blisters. Other reasons for having blisters are; very slack dough, loose moulding, under fermented dough, excessive top heat in oven.

Deficiency of Bloom

Bloom could be affected by a number of factors like quality of raw material, faulty formulation, inadequate fermentation, faulty conditions during proofing and baking and so on. Allowing rest of the conditions to be adequate, the most important factor responsible for imparting bloom to bread is the diastasis capacity of flour. Sufficient sugar production and formation of dextrin during baking operation impart this desirable characteristic to bread. If the flour is deficient in diastase, it should be supplemented with addition of malt to remedy this defect. Malt flour can also be useful and can be made by the baker.

Hard (Flinty) Crust

At times bread has crust which is hard and breaks like an egg shell. Such crust is known as flinty crust, and is usually related to products made from very strong flour which is insufficiently fermented specially if the dough is also tight. As most of the wheats grown in the country do not contain gluten of such strong nature, a baker is less likely to encounter such problem on this score. However over use of oxidizing agent will also produce flinty crust.

Colour Spots

Brand names etc. are printed on the flour (jute) bags and occasionally particles of dye may penetrate through into the flour. When water is added to flour, colour spots develop, and if not detected during dough stage, the bread will show these colour spots. Except this (apparently) inherent reason, colour spots are entirely the result of lack of care by the baker. While greasing the moulds, if excessive quantity of fat is taken in the brush, some of it will deposit in the corners of the mould which will ultimately, create dark spots. Unclean moulds, handling of bread with unclean hands or unclean gloves while de-panning, unclean cooling racks, falling of soot from the chimney (in wood fired oven), presence of sugar crystals, milk pallets, unclean work-benches specially if cake decoration is also done on the same benches and a number of such other factors are responsible for creating colour spots in bread.

Too Thick Crust

When expansion of bread in the oven (oven spring) is insufficient, or bread is left in the oven for too long a time, there will be more concentration of heat on the outer surface of bread rather than heat penetrating in the bread. This condition results in bread having a thick crust.

Reasons for lack of oven spring are;

1. Lack of diastatic activity in flour
2. Lack of sugar and fat in the formula
3. Poor quality, or too strong flour
4. Over fermented dough
5. Lack of moisture in the oven

Over baking of bread will invariably result in bread having thick crust or if oven is cool, the bread has to be baked for longer time which will produce thick crust.