THESIS ON BREAD

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BREAD

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Bread is the most important food that has been adopted by mankind. Nothing in the range of domestic life so affects the health of people as does their daily bread. Good bread is the product of high art, a proof of advanced civilization. A well-baked aerated loaf of bread is the pride of the housewife, while heavy sour bread is a cause of humiliation. But it is an actual fact that good wholesome bread is the exception in many homes. Why should it be? Bread-making is one of the easiest branches of culinary science, if only a little thought and attention be given to it.

It would be presumptuous for me to attempt to give a scientific treatise on the basis of my own experiments; for the science of bread-making has not yet been satisfactorily worked out. I shall merely state what knowledge I have gained from this interesting study and the experiments which I have performed in regard to it.

For the making of good bread we require only yeast, flour and some liquid. Saccharomycetes or yeast fungi are one celled plants of the lowest form of vegetable life. They multiply by budding. They live isolated or in colonies. The cells are globular, oval, or elliptical in shape. For the

purpose of multiplying the cell pushes out a small rounded protuberance which becomes filled with some of the contents and gradually assumes the form and shape of the mother cell. The best condition for the growth of the yeast plant is a warm moist sweet nitrogenous soil. The yeast plant is killed at a temperature of 212 F, while freezing does not destroy it, if it is slowly thawed so that the cells are not broken. I used Fleischmann's Yeast for all my experiments. It is very essential that this yeast be fresh.

The next important ingredient for bread making is the flour. It is not essential to have extremely white flour but we must have flour which contains considerable gluten. Gluten is a nitrogenous flesh-forming element of a dark greyish color. If of good quality it will be very elastic and not sticky when separated from the flour. To obtain the gluten from the flour I took two parts of flour to one part of water and formed a stiff dough. I then allowed water to run over the dough, washing out the starch and leaving only the gluten. We obtained the same material when we chew wheat. The more gluten flour contains, the better it will be. Good flour should leave an impression of the fingers when squeezed in the hand. It should be elastic, easily handled, a little gritty

in texture, and when made into dough should take up considerable water.

As to the liquid in bread-making one can use either water or milk or a mixture of the two. Bread which is made with milk dries outmore quickly than when made with water. I find no difference in taste.

Salt is also added to the bread to season it. A little sugar and butter too may be added, but merely as a matter of taste.

In making bread for one loaf I used:

1/4 cake yeast, dissolved in warm water.

1/2 cup of warm water.

1/2 tsp. Salt.

1 " Sugar.

1/2 " Butter.

2 1/4 to 2 1/2 cups Flour.

These I mixed in the order given. Then I very thoroughly kneaded this dough, and kept it at an even tempertature by placing it in warm water until it had doubled its bulk. I then kneaded it thoroughly again, kept it at an even temperature, and when it had again reached double its bulk, placed it in a hot oven.

Now go back to what takes place in the dough when first mixed. The flour contains some glucose, this glucose is broken up by the action of the yeast. It is not known in just what way this takes place, but as a result, instead of glucose we have carbondioxide gas and alcohol.

$C_6 H_{12} O_6$ + yeast = $2C_4 H_6 O + 2CO_2$ One part of glucose = 2 parts of alcohol + 2 parts of Carbondioxide gas. The gluten in the dough, being elastic, expands and holds the $C O_2$ gas, thus causing to be formed little gas bubbles through out the dough.

Kneading of bread is the process of thoroughly working the dough, the first time for the purpose of thoroughly mixing the ingredients and the second time to make the gas bubbles of equal size. The bread should be taken from the bowl, and placed on a slightly floured molding board. Then with the tips of the fingers bring the parts of the dough which are the farthest away up toward the center, next push the dough back with the base of the hand. Continue to do this until the dough when pressed with the finger will spring quickly back in place. One must be careful as to the amount of flour used while kneading the bread. There is danger of getting too much and thus making the bread tough. In the first kneading use only what is essential for the handling of

the dough. In the second kneading, if possible, no flour should be used.

The temperature at which bread should be raised is a very important consideration. Most people who have studied this subject give no exact temperature, but agree that it should be between a temperature of 70° F and 80° F. I have experimented with the following temperatures:

	time to raise
120° F	.55 min.
90° F . . .	.1hr.43 "
85° F . . .	.1hr.10 "
80° F . . .	.1hr.20 "
77° F. . .	.1hr.45 "
75° F . . .	.1hr.50 "
65° F . . .	.2hr.40 "
50° F . . .	.4hr.35 "
40° F . . .	.9hr.20 "

I found that bread kept at a temperature of 120° F was entirely too light and had no sweet nutty flavor. This same fault is found with bread kept at a temperature of 90° F or 85° F, while there appeared very little difference in the bread kept at 75° F or 85° F. The bread kept at 65° F or 50° F was rather heavy.

At the temperature of 40° F. the acetic fermentation had set in rendering the bread unfit for use. From my experiments I have obtained the best results from a temperature of 77° F.

In baking the oven should be at a temperature of about 360° F or hot enough to brown to a rich color a teaspoonful of flour in five minutes.

In baking when the crust is formed the starch has been changed into dextrin which gives the brown color to the crust and the darker brown which is often obtained is carmel or melted sugar. And as all sugar must be changed into starch before being digested this is why the crust is more easily digested. The temperature on the outside of the loaf is 400° F and in the inside only 212° F as the water can only reach that temperature.

When the bread is thoroughly baked it comes easily from the pan and the bottom of the loaf will not burn the hand.

When taken from the oven the bread should be placed on a bread rack so as to allow the free circulation of air around it, but cover the top so that that no hard crust will be formed. When cold the bread should be placed in an air tight tin box so as to prevent its drying out.

The bread has been baked for the purpose of cookingthe starch driving off the alcohol and the C O gas. When the bread becomes dry if placed in the oven for sometime it will regain its freshness and taste almost like a fresh loaf.

The aim in bread-making is to secure a loaf which is sweet and nutty in flavor, is of uniform, fine texture and has a light brown crust. But the essential point is that it be wholesome.

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