BIOTECHNOLOGICAL METHODS AND MODERN TECHNIQUES OF ENSURING THE BREAD QUALITY

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Abstract: Speculating the synergy of the relationships between the different microorganisms which assure the dough fermentation led to using different combinations of yeasts of superior and inferior fermentation and lactic bacteria. The technical equipment, the quality of the raw material are elements vital to the quality of the bread. Modern techniques are being used, which, at an industrial level, have good results, such as intensive kneading, using cold and modern methods of baking the dough. The bread making tradition together with modern technology is considered to be the complete solution for a prosperous business.

Keywords: intensive kneading dough, refrigerated dough, frozen dough, yeasts, lactic bacteria, baking

INTRODUCTION

The method is the process or the combination of processes, principles and rules used for achieving a purpose. Within the methods, the process is the means used for reaching a certain result. It is the chosen practical solution which functions as a system of conducting or producing a thing. The engineer combination of these methods defines technology as "a science of methods" and means of processing materials, the sum of processes methods and operations used in order to obtain a certain product. All the variants adopted are related to classic, traditional technology. The important phases of the evolution and bringing up to date of this technology existed for each technology operation. Kneading at high speed reduces the time of forming the dough and assures a smooth and uniform porosity of the crumb. In order to slow down the biochemical microbiological processes and that of "retrieving of the starch", the bulk dough, the dough pieces, the pre-baked dough and the cold final product are either refrigerated or frozen. There are modern uses of cold which also have a social impact both at operators' level and the bread consumers' level. The vital phase is, no doubt, the passing to preparing the bread from leavened dough. When this occurred is not known for sure, but the Egyptians, the Jews and the Greeks were making bread from

leavened dough. They used for fermentation “old dough” or must of grapes (Anghel I, 1991). The producers’ attention is oriented towards assuring the high and constant quality of bread production.

THE CLASSICAL TECHNOLOGY OF BREAD FABRICATION

The sum of processes and operations carried out in a certain order and following certain operational parameters make up the technological scheme of bread fabrication. The technological chain can be continuous or discontinuous, partially mechanized or highly automatic and mechanized.
The classical technological scheme consists of more phases. The flour, salt, water, biological sponges, other auxiliary materials are first signed in (in quality and quantity), then they are deposited, conditioned and portioned. The flour is dosed accordingly (10-15 %), a percentage of the total flour, the water according to the hydrating capacity, the biological sponges (0,1%), then, they are kneaded for 8 minutes and left to ferment for 5-8 hours at a temperature of 25-28°C. The fresh dough is thus obtained. The medium is then refreshed with flour (25-45%), water (20-40%), biological sponges 0,3%, everything is kneaded for 8 minutes and left to ferment for 3 hours at a temperature of 28-29°C. This is how the leaven is obtained. For preparing the dough we add over the leaven the rest of flour, the salt 1,5%, the auxiliary materials and the rest of water. It is kneaded for 8-12 minutes and left to ferment for 60 minutes at a temperature of 32-35°C (Auerman, 1960, Giurca, 1980). A quantity of fermented material is taken from the leaven. We do this in order to prepare another leaven according to the fabrication recipe and the dough preparation chronogram, according to a certain pace. The multiple phased procedures are procedures of preparing the dough in consecutive cycles, chained together through the leaven phase. After half the time of fermentation, the dough is being kneaded again. The separation into pieces with a weigh according to the type and to the losses during baking, is done manually or mechanically. The piece of dough is pre molded and pre leavened for 5-8 minutes. Then it is molded in the final shape and it is leavened at a temperature of 32-35°C and φ =80-85%, for 15-40 minutes. Prior to putting it into the oven, the leavened piece of dough is notched, punched and smattered. The baking is done in the baking chamber of the oven. There are different constructive models of ovens, according to different functional principles, at a temperature of 240-260°C for a period of 17-40 minutes. Hot bread, when it is taken out of the oven, it is smattered then sorted, wrapped and stored accordingly. The product thus obtained is

made of dough prepared by indirect means: in three phases: - fresh dough-leaven-dough. If we drop the fresh dough phase, then the procedure is indirect: in two phases: leaven-dough. If we drop the fresh dough and leaven phases, then the procedure of preparing the dough is direct. All the ingredients are mixed in a single phase. There are advantages and disadvantages of the direct and indirect procedures used for preparing the dough.

The classic technology has suffered alterations at preparing the dough. Different constructive models of malaxating machines are used for mixing, built according to different functioning principles.

The equipment for the other operations and the plants used have evolved toward improving performances. The equipment conducting the technological chain of preparing the bread – the oven – has suffered alterations at the heating system, the power supply and the productive capacity.

The tendency of producers in the bread industry is channeled towards quality, productivity, mechanization and automation. The system can be dealt with only by using advanced methods and procedures of preparing and manufacturing the dough. In order to improve the productivity, to increase the duration of bread newness, to alter the biological percentage, we add to the dough the auxiliary materials of different derivation, especially vegetal, as complete or incomplete premixtures.

PREMIXTURES IN THE BREAD INDUSTRY

There are mixtures that contain part of the ingredients in a recipe or all of them except for the hydrating liquid. By using them, the dosing mistakes are avoided and many hours of labor are spared. They are easy to use and, despite the high price, they are more practical. They can be: complete, incomplete, industrial, for collectivities and for home use. They come as paste or powder. The components which can be absent are those found in another state than the pulverulent one, such as milk, eggs, and that is why they are added. The premixtures have different basic components according to their destination. There are specific premixtures for preparing a certain sort (patisserie, Turkish flat bread) or with specific destination (frozen dough), for improving the characteristics of the faulty flours (Takano, 2003, Formgia companie, 2003), and for strengthening the bread. Using premixtures is recommended to be done during their biochemical and microbiological stability. This is the result of nature of premixtures'

components, of the mixture's homogeneity and of the size of its particles. (Bordei, 2002)

Estimate of the ferment activity of bakery yeasts belonging to the Saccharomyces cerevisiae type when put together with other microorganisms

The aeration of the dough is traditionally done with biochemical aerators using the superior bakery yeasts belonging to the Saccharomyces type, the Saccharomyces cerevisiae species of the Saccharomycetaceae family. From the "old dough" and the must of grapes, at present, we use selectioned microorganisms added as biomass. They have the role of kindling the fermentation in the dough. In order to improve the quality of the final product by the contribution of the fermentation process, we add the fermentation biomass formed of combined microorganisms (yeasts and bacteria) or the fermentation substratum of these microorganisms (the composition of the fermentation medium).

COMMERCIAL TYPES OF YEASTS

The ferment activity is the most important technological characteristic of the bakery yeast. It is added as biomass, fresh, compressed, actively dried, protected dried yeast or instantly dried yeast. (Caron, 2002) The ferment activity of the yeast expressed in cm ^{3} of gas (CO_2), produced by 1 g of yeast, reported to the dry substance, per hour, it is higher for the freshly compressed yeast as compared to the regular dried protected or instant yeast. (Bordei, 1993) The optimizing of the ferment activity of the biological aerators is also done by using the mixed cultures of microorganisms of different types or species. Due to the metabolic compatibility, we can use, together with the bakery yeast belonging to the Saccharomyces type, the lactic bacteria culture belonging to the Lactobacillius type. The yeasts better grow in the presence of lactic bacteria. One of the factors that condition the cohabitation in the dough of the yeast bacteria is exactly the latter's capacity to metabolize the lactic and acetic acids. The yeasts provide the bacteria with growing factors, they consume through their metabolism the oxygen in the dough, creating favoring conditions to the grow of lactic optional anaerobic bacteria. (Collar, 1992). The lactic bacteria culture is used as culture dough which contains flour and water 1:1 or 1:1,5, where it is added the pure culture of lactic bacteria. The mixture is let to ferment at a temperature of 25-35°C, up to an acidity of 10-20 degrees, pH = 4,5-3,5, obtained in two hours. It is used for preparing the dough, together with the yeasts, at a ratio of yeasts-bacteria – 1:2, considered to be optimal for obtaining a bread with

pleasant taste and aroma. There are different preparation procedures of the liquid yeasts. There are three phases of obtaining and these are: preparing the culture medium, its fermentation with acid-lactic bacteria, and multiplying the yeasts in the reproduction and production cycles (Voicu, 1992). The culture media are prepared from different raw materials (wheat flour, bran, rye flour, corn, soya flour) mixed with water in different proportions. The pulverulent portion can either or not undergo a hydrothermal treatment. In order to optimize the fermentation power, for processing the medium, we add enzymes compatible with the medium and the minerals (Voicu, 1999). The presence of mixed cultures of yeasts and acid-lactic bacteria led to reducing the fermentation time of the dough and the aroma, the taste and the colour of the crust, the elasticity, smoothness and the porosity of the crumb were superior to those in the blank test (Voicu, 2000). After 24 hours, the quality indices of the bread were superior to the value obtained for the current production. The humidity of the bread increases with 1% and the specific flour consumption decreases from 0,769 kg/kg for the classic technology to 0,714 kg/kg for the mixed cultures procedure (Voicu, 1995). In 2002, the use of preferment was introduced, as means of optimizing the fermentation process (Voicu, 2002). Using the yeast belonging to the *Saccharomycopsis fibuligera* type is done in mixed culture with the bakery yeast which belongs to the *Saccharomyces cerevisiae* type, for the direct procedure of preparing the dough. Saccharomycopsis fibuligera has a slower metabolism than the Saccharomyces cerevisiae. By putting them together, the generation time of the total number of cells is reduced and the glucoamilazic activity is cumulative (Bordei, Dan, Nicolau, 1996). The yeast biomass Saccharomycopsis fibuligera has an acute honey, fermented fruit aroma, different to that of the Saccharomyces cerevisiae yeast. In media with 4-5% starch, as sweetener, Saccharomycopsis fibuligera releases into the medium the amiloglucozidaze. At an optimal ratio S.c:S.f of 3:1, it is obtained a bread with organoleptic characteristics as good as those for the blank test prepared with the diphase method (Dan, Nicolau, and others, 1996). The fermentation is potentated due to the accumulation in the dough of a greater quantity of reducing glucides. By using the typical yeasts belonging to the *Saccharomyces ellipsoideus* and *Thorulopsis holni***,** for the fermentation of the wine, as commercial products, the savor and the aroma of the bread are improved. It is used in combination with the S.C. yeast at a ratio of 1:1 (Surza, 2003). The fermenting potential of the wine yeasts is inferior to that of the bakery yeasts. This is due to the buffer effect of the flour (Richard-Molnar, 1994).

THE LACTIC BACTERIA CULTURE IN DOUGH

There are different types of lactic bacteria culture dough. These are different mainly in the starter lactic bacteria culture, the way of cultivating the bakery yeast and the chemical make-up of the inoculation medium. Preparing the culture dough belongs to the first phase of bread fabrication and namely preparing the dough (Bordei, 2004). The CLL – the concentrated lactic leaven is obtained in three cultivation consecutive phases. The medium is refreshed with flour after each phase. In a ration of 70-74% flour and water, are added bacteria belonging to the *Lactobacillus* ferments, mezofil heterofermentative microorganisms with activity peak at a temperature of 35-37°C. The white or large extraction flour is used. For improving the nutritive medium with fermentescible sugars, the flour suspension is totally or partially scalded, but it is recommended that the temperature should not exceed 63°C, so that the enzymes in the flour should not be destroyed. The CLL is added in doses of 10% of the flour according to the method of dough preparation. If it is associated with intensive kneading of the dough and the increase of the temperature to 34°C, it is recommended that the dose of yeast should be increased as well with 0,5-1%. By using CLL, the total time of fermentation is reduced and the qualities of the bread are much superior. The choice of microorganisms is influenced by the type of flour. The pH of the flour and water suspension is given by that of the flour (Banu, 2000). For a better aging of the dough, we can use SBD obtained by the "San Francisco" procedure, which contains broth of bacterial sour dough, maltose, hydrolyzed casein, yeast extract, yeast suspension, monostearat sorbitanpolioxiletilene. The bacteria belong to the *Lactobacillus san francisco* type. There are methods of preparation of the culture dough which use as microorganisms the starter culture of lactic bacteria together with the yeast belonging to the Saccharomyces cerevisiae type. Part of the total quantity of yeast is added to the preparation of the culture dough, and the rest during the rapid kneading. Preparing bread by processing the flour made of Canadien tough grain, using for the dough aeration propanoic bacteria together with the bakery yeast, leads to achieving a special aroma and to improving the nutritive value of the bread (Segal, 1991). The used bacteria are specific to the cheese industry. They give only 20% of the fermentation volume, but, due to the dough composition, they provide a special aroma (Levesque, 1991, Bordei, Teodorescu, 2000). The culture dough is added in a proportion of 10-12%. The enzymatic activity within the dough is reduced due to the high acidity of

the starter culture. The low pH hampers the activity of the bacteria which produce “the extension disease of the bread” (Concearov, 1977). According to the predominant type of bacterium in the starter culture, the bouquet of aroma is different. It is completed by adding the yeast to the dough. The starter cultures have an antibiotic action, through their metabolism products ensuring a certain degree of inocuity, the lactic acid playing a very important part.

The pulverulent intermediate yeast products (the SPD) are used in the bread manufacture for starting the fermentation process, for reducing the duration of the technological process of fabrication of the bread without negative effects over it. It allows the interruption and the quick resuming of the process of production which is an important aspect for organizing the activity of the factories in one or two shifts. The SPDs are obtained from flour of different types, water and yeast (1-2%). The water is added until the mixture has a humidity of 18-28%. It is let to ferment according to the temperature of the mixture for 8-48 hours at a temperature of 20-30°C (Bordei, 1993, Bordei, Teodorescu, Toma, 2000, Banu, 2003).

TECHNICAL PROGRESSES. APPLYING THE INTENSIVE QUICK KNEADING OF THE DOUGH

The basic raw materials but also the additives are mixed and kneaded in order to obtain the dough with specific rheological characteristics. The kneading operation is very important for obtaining superior quality indices of the final product. During the kneading the spatial configuration of the proteins is rearranged, the disulfidic bridges are broken, the no covalent connections are established between the proteins and other components. Compelx networks made up of films of proteins appear. In the case of classical kneading, the completing of the structure of the gluten is not so good as for the intensive quick kneading. The microscopic structures showed that during the intensive kneading, the “films” of gluten are better spread around the starch grains and the other components than in the case of classical kneading (Giurca, 1980, Bordei, 2000). The time of formation of the dough is significantly reduced from 12 minutes, for the classical kneading, to a few seconds, with the new technique. By reducing the fermentation time in bulk of the dough from 180-240 minutes to 0-45 minutes and increasing the time of final fermentation from 50-60 minutes to 150-240 minutes, a superior value of the bread volume and of the porosity of

the crumb is assured. Because the period of adaptation of the microorganisms to the environmental conditions is decreased, it is recommended to supplement the quantity of the yeast. Even if other quality indices of the bread obtained from a dough made through intensive or quick kneading are impeccable, the aroma is diminished, or even absent. Obtaining the aroma given by a natural fermentation is hard to replace. It is recommended to use this type of kneading for processing the flour from tough grain, but also for processing weak flours (Williams, 1989). Adding different materials such as oxidizing agents, especially ascorbic acid, emulators (the lecithin) are factors which influence the development of the dough. Kneading at high speeds, at air pressure, ensures a smoother dispersion of the air in the mass of dough and the intimate contact of the components of the mixture. The oxidizing of the pigments and of the tiol groups is increased. Good results are obtained by using the procedures that use modified pressure and namely the suprapressure (Am-flow, Do-Maker, Brimec) and the subpressure (1,5 kgf/cm^3, No Time). The carbon dioxide formed during the final fermentation does nothing else but increase the volume of the pores, at the further processings of the dough, ensuring a smooth and uniform porosity of the crumb. In France it is used a combined method of kneading and namely, in the first phase, the ameliorated kneading and in the second phase the intensive kneading, together with the addition of the ameliorating agents to the dough. The vital parameters of the kneading are the speed of the kneading pallet and the time of transferring the energy to the dough. The quantity of energy transmitted to the dough depends on the quality of the flour and to the method of preparing the dough. This energy must be transmitted in the shortest period of time in order to achieve the effects of the intensive kneading. There are different constructive models of kneaders used for kneading the dough at high speed, which are different in the shape of the kneading pallet, the sealedness of the pail, its mobility and its shape, the possibility to modify the working pressure, the capacity and the way of functioning (continuously or discontinuously) of the installation.

USING COLD IN BREAD MANUFACTURE

Cold in bread industry implies achieving the following frigorific chain refrigerating – freezing – defrosting. These phases are different because of the value of the operational parameters. Both some raw materials and the intermediate but also the final products must undergo these phases. If initially cold was used only for storing the perishable raw materials, for

cooling the water circulating through the encasing of the intensive kneaders, for controlling the fermentation of the dough, at present, using cold has conquered new territories. Cold was used for the first time by Fornet in 1920, in Germany, with the purpose of slowing down the fermentation of the intermediate products. Nowadays, in the United States and in many other countries, cold has a very significant role.

The refrigerating, the first link of the frigorific chain, is done with the purpose of reducing for a while the intensity of the biochemical and microbiological activity in the dough or the leaven. The piece of dough, and only seldom the bulk of dough is refrigerated. Due to the drop of temperature at 2-8°C, the mobility of the molecules of the dough decreases and the enzymatic activity is slowed down. The enzyme resumes its activity more or less at the initial value, when it comes back to the optimum working temperature (Lehninger, 1987, Takano, 2002). The microbiotics of the dough being mesophilic, it has the minimum activity at 15-20°C. Under this value, the metabolic index Q_{10} has a much smaller value. The intermediate products are refrigerated for 8-18 hours if they contain fats, sugar and for 36 hours at a temperature of 2-8°C. The optimum time is 16 hours. Reheating the intermediate product is done up to the temperature of the environmental medium, 25-26°C, in approximately 1 hour. The intermediate product then undergoes the final fermentation. Storing the refrigerated intermediate products is done in cold storage rooms or cases, and for large quantities in tunnel rooms at temperatures of 2-8°C and a relative humidity of 70-80%.

The dough to be frozen is obtained according to fixed, well-known technological schemes, according to the type. The freezing is done either after the final molding, or after the prefermentation. According to some specialists, it is best to chose the moment of the freezing when the fermentation of the dough is described by the phase of initiation of the microorganisms and not by that of the detachment of the filial cell. The cryoresistence of the yeast cell is maximum at this point and it can influence the moment of freezing (Neyreneuf, 1993). Until 1997, Hoseney and Ling reached the conclusion that in the absence of the fermenting products, the freezing temperature influences neither the active yeast nor the inactive one. The presence of the fermenting products causes major flaws of the activated yeast. The freezing is done at the temperature of -18÷ -20°C and it is completed when the temperature in the thermal centre of the dough is of -10°C. an important parameter of the freezing is the freezing speed, which depends on the result of the diameter and the mass of the dough, meaning the freezing time and the multipliers which have given values according to the

freezing temperature. The freezing temperature depends on the content of fats and sugar of the dough. The sugar reduces the freezing time and the fat increases the freezing time. There is a formula used to calculate the freezing time according to the content of sugar, that of fats, and the freezing temperature. The frozen dough is stored in special conditions and namely at temperatures of -18°C, the relative humidity of the air of 80%, with the air flow at the level of the products, y respecting the degree of loading with dough of the storehouse and respecting the hygiene rules at all times. The optimum storage duration is of 1-2 weeks. A duration longer than 6 weeks in a frozen state badly affects in a negative way the rheological qualities of the dough and the viability of the yeast (Inone and Busuk, 1992, Neyerneuf, 1991, 1993).

Defrosting the dough is done until the temperature of the environmental medium in two phases or quickly at 30°C. After defrosting the dough undergoes a final fermentation and then it is baked. The refreezing has negative effects on its characteristics. In order to preserve the crumb structure and the aroma, the fresh bread is frozen. The bread manufacture products with a content of materials (sugar, eggs, fats) are more appropriate for freezing than those made of a simple dough. The moment of freezing may come after the baking phase, when the volume of the bread is completed, so before the end of the baking (the prebaked bread).
Regarding the scientific aspect, it may be said that the cooling parameters must be respected in order to avoid fabrication flaws of the bread made of frozen dough. The intensity of the biochemical and microbiological activity in a dough, is decreased. The transformation of the water into ice is considered to be a dehydration, a good means of preservation for a long period of time, which protects the biochemical components. It is a reversible and typically stationary phenomenon. Due to the temperature drop, the activity of the a_w water is decreasing, which causes the alteration of the enzymatic activity and of the germ metabolism. The quantity of free water in the dough decreases due to the progression of the ice front. The concentration of the soluble substances increases and, at the same time, the osmotic pressure increases as well. The number of the ice crystals and their size depends on the cooling speed. This speed of the progression of the ice front may be slow v = 1°C /min, quick v = (1-10) °C/min and high-speed v >10°C/min. The nucleation appears when the eutectic point temperature is reached. The non-frozen water is a fraction which is fixed through hydrogen connections to the polar groups of other molecules and whose connecting

energies are superior to those existent between the water molecules of the ice crystal. At -30°C the ration of frozen water is 46% and at -35°C, it is 35%. The complete freezing is obtained at -33°C. With the help of electronic microscopy the structure of the dough undergoing freeing has been studied. Breaches appear in the glutenic coat, due to the sharp edges of the ice crystals and the starch grain has been released. These blanks increase at a forward processing and give a coarse porosity to the crumb (Mitelut, Popa, 2000). The rheological characteristics of the dough are weakened. Due to this aspect, a good choice would be processing the flours with proteins with a high association degree. They form compact, cohesive doughs, with a high stability of the structure to freezing (Berlung, 1991, Dapron, 2000). The activity of the microorganisms within the dough undergoing freezing is influenced and structural and functional flows may occur. There are alterations at the level of the cell membranes, among which the attenuation of the membrane proprieties and the inhibition of the syntheses of the proteins. These are indirect effects of using low temperatures (Cometainel Corbineanu, 1994). The germ cell in a vegetative recumbency is more resistant to low temperatures than the activated one. During the freezing, ice crystals are formed, first in the watery phase which surrounds the germ cell and then in the cell cytoplasm. The metabolic products released in the medium during the fermentation, form concentrated mixtures during freezing, which cause the autolyses of the cells. The metabolic products with autolitic activity are the grain alcohol, the lactic acid, the acetic acid, and small quantities of steres, such as the acetate and the ethyl lactate (Neyreneuf, Delpuech, 1993). This aspect is important for choosing the moment of freezing. The improvement of the viability of the bakery yeast does not mean the improvement of its baking qualities (Tarau, 1993). The sugars protect the yeasts during freezing. Among the biochemical components of the yeast cell, the trehalose is a good protective agent (Meric, 1995, Gelias, 1993, Stauffer, 1994). The linoleic and oleic acid from the composition of the fat acids and the membrane phospholipids influences the resistance to freezing of the germ cells. It is advised that for making the dough to be frozen, we should use microorganisms with an improved genetic potential, suhes resistant to low temperatures (Szop, 1992, Neyreneuf, 1993, Takano, 2002). A genetic technique has recently been patented in Europe for obtaining the yeast sushes with a high content of trehalose, but not larger than 17%, and a content of 46% protein. The trehalose, the reserve glucide of the yeast cells, is accumulated between the cell wall and the cytoplasmatic membrane and forms a buffer. The trehalose forms hydrogen connections

with the water and the phospholipides and it is thus prevented most of the crystallization of the water. In the case of the bakery yeast belonging to the Saccharomyces cervisiae type, an “antifreeze” protein has been identified. Amino acids accumulate in the frozen dough, the relationship between them being modified. The concentration of tripophane and arginine decreases and the concentration of glycine and tyrosine increases. The dough submitted to the links of the frigorific chain and to the following operations makes bread with coarse porosity, with big pores, thick walls, thick crust with a harsh surface (Takano, 2002). The staleness of the bread does not occur immediately after taking it out of the oven, due to the fact that the progression of the humidity flow is done at a speed higher than the temperature flow. In the gap -15÷ 20°C, the molecular agitation is canceled and the recrystallization of the starch can not occur, the crumb remaining frozen in its state of freshness. The prebaked bread is submitted to a quick freezing in the gap -20÷ +5°C, when the staleness is more evident. The ice crystals that are formed are small and numerous and damage less the structure of the crumb. As a conclusion, using the artificial cold in the bread manufacture, from a technical point of view, leads to a better organization of labor and the increase of labor productivity, by taking over the production peaks and eliminating the night shift. The frozen dough is marketed as such or it is taken over by the bake-off bakeries where it is processed at the moment when it is required by the consumer. Thus, it must not be a concordance between the moment of preparing the dough and the consumption of the bread or the bread manufacture products. The piece of dough may become bread in a different place than that where it was prepared. Progresses have been made regarding the “protection” of the biochemical and microbiological processes within the dough (Mitelut, 2000).

MODERN METHODS OF BAKING

Turning dough into bread is done through baking. People switched from the rudimentary to the modern method of baking. The constant variation of the values of the parameters during the entire period of baking has been reduced to three temperature intervals f the baking chamber. Zone I 160-180°C, zone II 280-300°C, zone III 180-200°C is specific to the ovens which function continuously. The massive ovens have been replaced with those with an elegant design, which are much more economical. They ensure a uniform baking of the dough and generally have the timely capacity of small production. The modern technique enables us to obtain types of bread at

different baking parameters, at the same time, in the same oven (www.guetespanola.es, 2004). In the countries with a high production of energy, the ovens with electric resistances are highly used. The producers are required to use infrared ovens, with bake stones heated with high frequency currents or with combined sources of baking the dough. The ovens with annihilating pipes are very much used (AGIV FORMI E ATTREZZATURE – ITALIA, 2004), the same as the modular rotary press which combines the traditional line with the innovation of the compact dimension, functionality, strength and unique design (GALILEO, HELCO-ISO 9001, 2003), the cyclothermics which have an ingenious system which allows heat to accumulate and distributes it towards the baking chamber. The system of guiding the heat necessary to heat the baking chamber is the secret of the success of the producing companies which build ovens for the bread manufacture.

CONCLUSIONS

The premixtures for the bread industry are an accessible alternative which can be directed strictly towards a certain assortment or method of preparing and processing the dough.
Optimizing the activity of the biological aerators is still a concern of the technological and biological engineering. The ways of research have been put into practice through practical applications, such as:
- using different commercial forms of the yeasts belonging to the Saccharomyces cerevisiae type;
- processing the substratum, enriching it with sources nutritive for microorganisms. The fermentation process produces the substances of the aroma of the bread. According to this aspect, there are different procedures to optimize the fermentative processes. Different procedures of preparing the dough are used, together with mixed cultures of biological aerators in order to separate the ways of metabolizing the piruvic acid, due to the different enzymatic equipment;
- the mesophile, heterofermentative and homofermentative lactic bacteria, combined with the lactic bacteria;
- the superior fermentation yeast belonging to the Saccharomyces cervisiae type, combined with the yeast belonging to the Saccharomycopsis fibuligera type improve the bouquet of the aroma of the bread;
- the wine yeast combined with the bakery yeast.

These are added as mixed starter cultures, whose combination has been studied, beginning with their metabolic compatibility.
The mechanical development of the dough increases the yeast consumption, decreases the kneading time and ensures high values of the quality indices of the bread. An important aspect is that the mechanical development of the dough depends on the intensity of the mechanical energy transmission.
Using cold in the bread manufacture is a progress, from a social point of view, and, from a scientific point of view, it is a topic of research. The night shifts are eliminated and the bread production is no longer dependent on the phase of preparing the dough. The biochemical and microbiological processes that occur within the dough are slowed down. The resistance of the germ cell to cold depends on many factors and the choice of the moment of freezing is still under discussion. The glutenic coat can be cut by the edges of the ice crystals, thus producing a coarse porosity to the crumb. In the case of frozen bread, the "reduction of the starch", which is responsible for the staleness, is slowed down.
By the modern methods of baking, people passed from the rudimentary way of baking to the modern one, from the old and massive ovens to those economical, of an elegant design, which ensure the uniform baking of the piece of dough. The big capacity ovens have been gradually given up, in favor of the smaller ones. The modern technique allows us to make different types of bread, which are baked at different parameters, in the same oven, at the same time. In the countries with a high production of energy, the ovens with electric resistances are highly used. Nowadays, we use ovens with infrared radiations, ovens heated by high frequency currents, ovens with combined baking sources. Those with annihilating pipes, the modular rotary ones, the cyclothermal ones are very much used. They have systems of regulating the baking parameters, a pleasant design, they are ecological, ergonomic and acceptable from an economic point of view.

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