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# THE INFLUENCE OF THE PREPARATION METHOD OF THE PASTRY ON THE QUALITY OF BREAD

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**Abstract**

*In this research was determined the influence of the method of the preparation of pastry on the quality of bread using the direct preparation method and the indirect preparation method with addition of leaven, prepared from flour obtained of corn harvested in different past years, when the climatic conditions in the period of growth of the plants were different, so there were used two flours obtained from corn cultivated in a drought year and two flours obtained from the corn cultivated in a rainy year. There was determined that these climatic conditios influence in different way the technological features of the pastry obtained from these flours, respectively the finished products obtained from them. In this way, according to the qualitative features of the flours, which is directly influenced by the culture conditions (climatic conditions), the process behaviour during the technological process is different.*

**Key words**: direct method, indirect method, pastry, bread.

## INTRODUCTION

Together with the phisical and chemical indexes and the very important panification features, are also the technical features of the corn flour, that must be known and taken in consideration when the pastry is prepared. This operation includes the kneading, fermentation and the re-kneading operations. There are used two types of pastry preparations: the direct method (monophase) and the indirect method (poliphase).

## MATERIAL AND METHOD

There were used 4 pure kinds of corn, whom features are presented in the table 1, and in the table 2 are presented the features of flours produced from these types of corn.
G1- Alex corn; G2- Partizanka corn; G3- Romulus corn; G4- Partizanka corn.
G1 and G2– corn from the harvest of the year 2004
G3 and G4 – corn from the harvest of the year 2005
The year 2004 was a droughty year, and the year 2005 was a rainy year.

*Table 1*

The corn features

| **Feature** | **G1** | **G2** | **G3** | **G4** |
|---|---|---|---|---|
| Humidity, % | 13,25 | 12,21 | 12,32 | 13,53 |
| Ash, % | 1,58 | 1,18 | 1,09 | 0,81 |
| Protein content, % | 14,33 | 14,28 | 14,93 | 12,74 |
| Moist gluten % | 26,2 | 27,8 | 27,6 | 22,3 |
| Bending of moist gluten, mm | 6,5 | 7 | 10,5 | 11,5 |
| Sedimentation index- Zeleny,ml | 50 | 40 | 52 | 38 |
| Gluten index, % | 41,33 | 42,95 | 36,36 | 27,93 |
| Maltose index,mg/10g | 264,56 | 211,51 | 196,56 | 192,56 |
| ***Falling Number:*** | | | | |
| -Falling index | 434 | 383 | 305 | 352 |
| ***Alveographe*:*** | | | | |
| -Energy W*$10^{-4}$J | 68 | 94 | 110 | 107 |
| -Maximum pressure (P), mm | 96 | 85 | 95 | 88 |
| -Extensibility index, (G) | 8,6 | 11,6 | 11,9 | 12,2 |
| -Extensibility (L), mm | 15 | 27 | 29 | 30 |
| - P/L Ratio | 6,46 | 3,12 | 3,34 | 2,94 |
| -Elasticity index (Ie),% | 0 | 0 | 0 | 0 |
| ***Consistographe*:*** | | | | |
| - Humidity of the sample ($H_2O$),% | 11,80 | 12,20 | 12,40 | 12,60 |
| - Maximum pressure (Pr max),mb | 2072 | 3106 | 2400 | 2419 |
| - Absorbed water (Wa),%b | 53,1 | 57,7 | 54,6 | 54,7 |
| - Water hydration rate (Hydha),%b | 50,6 | 55,2 | 52,1 | 52,2 |
| - Absorbed water (Wa),%b14 | 54,9 | 59,6 | 56,4 | 56,5 |
| - Water hydration rate (Hydha),%b14 | 52,4 | 57,0 | 53,9 | 54,0 |

*Table 2*

Features of flours

| **Corns of origin** | **G1** | **G2** | **G3** | **G4** |
|---|---|---|---|---|
| **Feature** | **F1** | **F2** | **F3** | **F4** |
| Humidity, % | 14,60 | 13,77 | 14,08 | 14,42 |
| Ash, % | 0,64 | 0,48 | 0,55 | 0,38 |
| Protein content, % | 13,25 | 13,44 | 13,37 | 10,60 |
| Moist gluten, % | 28,5 | 29,5 | 30 | 23,7 |
| Bending of moist gluten, mm | 5 | 5,5 | 9,5 | 8,5 |
| Sedimentation index - Zeleny,ml | 48 | 37 | 44 | 36 |
| Gluten index, % | 47,73 | 48,45 | 41,47 | 34,30 |
| Maltose index,mg/10g | 290,18 | 253,36 | 253,45 | 217,93 |
| Acidity, % | 2,5 | 2,6 | 2,4 | 2,3 |
| ***Falling Number:*** | | | | |
| -Falling index | 451 | 394 | 296 | 270 |
| ***Alveographe*:*** | | | | |
| -Energy W*$10^{-4}$J | 104 | 185 | 108 | 223 |
| -Maximum pressure (P), mm | 72 | 81 | 69 | 101 |
| -Extensibility index, (G) | 15 | 19,1 | 15,8 | 18 |
| -Extensibility(L), mm | 46 | 74 | 50 | 65 |
| - P/L Ratio | 1,58 | 1,09 | 1,39 | 1,55 |
| -Elasticity index (Ie),% | 27,4 | 44,6 | 30,7 | 48 |
| | | | | |
| ***Consistographe*:*** | | | | |
| - Humidity of the sample ($H_2O$),% | 14,60 | 13,80 | 14,10 | 14,40 |
| - Maximum pressure (Pr max),mb | 2807 | 3045 | 3072 | 3117 |
| - Absorbed water (Wa),%b | 56,4 | 57,4 | 57,6 | 57,8 |
| -Water hydration rate (Hydha),%b | 53,9 | 54,9 | 55,1 | 55,3 |
| - Absorbed water (Wa),%b14 | 58,2 | 59,3 | 59,4 | 59,6 |
| -Water hydration rate (Hydha),%b14 | 55,7 | 56,8 | 56,9 | 57,1 |

**Leaven** – Pakmaya (commerce), **Salt** – extrafine alimentary salt (commerce), **Water** – drinkable water from the water network

**The operational program for obtaining the proucts was the following**

- *With the direct method*

The pastry was kneaded with spiral blender at low speed for 8 minutes, was blended at high speed for 4 minutes, was left at rest for 20 minutes, was formed, was molded into the pattern, was left to fermentation (final fermentation) for 50 minutes, was baked at $230^0$C for 35 minutes, was left for cooling into the pattern for 2 hours, was removed from the pattern and cooled for other 2 hours.

- *With the indirect method*

Half of the flour, water and leaven quantity, was blended for 8 minutes at low speed, after which was left in the blender tank for 6 hours and then there was added the rest of the flour, water, leaven and salt; after which it was blended at low speed for 2 minutes and at high speed for 8 minutes, was left to rest for 20 de minutes, was modeled, was set into the pattern, final fermentation for 50 minutes, baking at the temperature of $230^0$C for 35 minutes, cooling into pattern for 2 hours, removing from pattern and cooling for other 2 hours.

**RESULTS AND DISCUSSIONS**

The influence of the direct and indirect method on the bread from the F1 flour is presented in the table 3, on the F2 bread is presented in the table 4, on the F3 flour is presented in the table 5, on the F4 flour is presented in the table 6.

*Table 3*

The influence of the direct and indirect method on the bread made of the F1 flour

| **Sample of the F1 flour** | **DIRECT METHOD** | **INDIRECT METHOD** |
|---|---|---|
| Volume | 315 | 290 |
| Porosty | 76 | 72 |
| Elasticity | 94 | 97 |
| Acidity | 2.6 | 3.1 |
| Organoleptic rating | Specific taste and smell of the product, the white yellowish crust, core with uniform porosity | Specific taste and smell of the product, with a stronger fragrance, the white yellowish crust, core with uniform porosity |

*Table 4*

The influence of the direct and indirect method on the bread made of the F2 flour

| **Sample of the F2 flour** | **DIRECT METHOD** | **INDIRECT METHOD** |
|---|---|---|
| Volume | 330 | 305 |
| Porosty | 78 | 78 |
| Elasticity | 94 | 97 |
| Acidity | 2.6 | 3.2 |
| Organoleptic rating | Specific taste and smell of the product, the yellowish golden crust, core with uniform porosity | Specific taste and smell of the product, with a stronger fragrance, the yellowish golden crust, core with uniform porosity |

*Table 5*

The influence of the direct and indirect method on the bread made of the F3 flour

| **Sample of the F3 flour** | **DIRECT METHOD** | **INDIRECT METHOD** |
|---|---|---|
| Volume | 330 | 325 |
| Porosty | 78 | 78 |
| Elasticity | 94 | 98 |
| Acidity | 2.5 | 2.9 |
| Organoleptic rating | Specific taste and smell of the product, the yellowish golden crust with a heavier shade, core with uniform porosity | Specific taste and smell of the product, with a stronger fragrance, the yellowish golden crust with a heavier shade, core with uniform porosity |

*Table 6*

The influence of the direct and indirect method on the bread made of the F4 flour

| **Sample of the F4 flour** | **DIRECT METHOD** | **INDIRECT METHOD** |
|---|---|---|
| Volume | 280 | 310 |
| Porosty | 74 | 78 |
| Elasticity | 88 | 96 |
| Acidity | 2.6 | 3.2 |
| Organoleptic rating | Specific taste and smell of the product, the yellowish brown crust, core with uniform porosity, slightly frail | Specific taste and smell of the product, with a stronger fragrance, the yellowish brown crust, core with uniform porosity |

**RESULTS AND DISCUSSIONS**

Following the results there can be determined that the higher volume was obtained for the samples realized with the direct method, unless the sample obtaine from the F4 flou, where could be observed an increase of the volume by indirect method. This is explained by the fact that, the F4 flour from which the sample was obtained has a lower gluten content and falling index, and after the prolongation of the fermentation time and the increase of the pastry acidity, the quality of the joints between the glutenic proteins are significantly improved without affecting too much the amilolithic activity. The significant decrease of volume for the samples obtained by the indirect method from the F1 and F2 flour is explained by the inhibition of the amilolithic activity due to the increase of the pastry acidity, as a result of the prolongation of the fermentation time, the amilolithic activity that is decreased for these two types of flour, which can be observed from their very high falling index.

From the perspective of the phisical and chemical parameters, there could be determined an increase of the elasticity for all the products obtained by the indirect method. Also the core of these products was not frail at all. This explains by the fact that at the preparation of the pastry by the indirect method, the fermentation time is considerably protracted, and the unlimited distension processes, of protein deflocculation are produced in a higher rate and the main and secondary fermentation products are formed

in higher quantities than by direct method, and as a result, the pastry is matured faster and more completely.

From the organoleptic perspective there could be determined that the products obtained by the indirect method have more pronounced organoleptic features (taste and fragrance) than those obtained by the direct method. This is due to the interaction between the fermentation products, which, because of the increased fermentation time, are produced in much higher quantities.

**CONCLUSIONS**

The preparation method influences a lot the organoleptic features of the finished product, so that those obtained by the indirect method are much superior from this point of view (taste, fragrance) but if some technological features of the flour are inferior (quality and quantity of the gluten), the finished products obtained by this method are qualitatively much lower (volume, porosity). The technological losses as well are higher are higher for the indirect method, and the possibility of automation by this method is impossible because of the alteration of the viscidity and elasticity features of the pastry which take place after the fermentation.

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