

THE MICROBIOLOGICAL PARAMETERS IN TECHNOLOGICAL PROCESS OF BREAD PRODUCTION

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Abstract

This working is focused on the microbiological evaluation of some specified parameters in the production of bread having as raw material flour. It has been determined the following microbiological parameters: NTG, coliforms bacteria, Bacillus mesentericus spores, Bacillus cereus, yeasts and fungi. It is important to analyze the way in which the technological process influences the variation of these parameters.

Key words: *flour, bread, Bacillus mesentericus, coliforms bacteria, Bacillus cereus, yeasts and fungi.*

Introduction

The evaluation of the microbiological parameters variation, which is in fact alimentary hygienically sanitary indicators, is considered to be extremely important, because in the present economical worldwide context, the basic nutrition of the human beings is bread and flour pastes.

According to the Order no.975/1998 of the Ministry of Public Health, the microbiological conditions, which must be fulfilled by flours in order to be considered hygienic and intended for panification and pastry, are the following:

- Bacillus cereus – 100/g
- Bacillus mesentericus – 100/g
- Yeasts and fungi – 100/g.

For bread, the standards in force are formed just from the number of yeasts and fungals that must not exceed - 100/g.

Experimental

Following the specified working technique it have been determined the microbiological parameters assigned to six panification flour tests taken from different private firms from Timisoara district, some of these tests were taken from the agricultural production of this country and others were imported tests. It could be note the six flour tests with the letter F followed by corresponding indicators of the order number: F1, F2, F3, F4, F5, F6, and the results are written in tables.

And so, the first parameter is NTG. It was interested the way in which the value of this parameter suffers transformations during the technological process of bread production and other products made from bread.

Results and Discussions

In the table 1, are presented the NTG values for the six analyzed flour tests, for the bread and the rolls made from bread.

Table 1. NTG values for the six analyzed flour tests

| Analyzed tests | NTG/gram | | |
|----------------|----------|-------|------|
| | flour | bread | roll |
| F ₁ | 96,500 | 1,600 | 420 |
| F ₂ | 91,000 | 1,250 | 325 |
| F ₃ | 88,300 | 1,050 | 303 |
| F ₄ | 94,000 | 1,420 | 370 |
| F ₅ | 73,100 | 870 | 68 |
| F ₆ | 62,000 | 720 | 56 |

By analyzing the tables data could be noticed an extremely important diminution of the aerobes mezofiles germs in final products – bread and rolls, comparative with the number registered of these germs in flour.

The explanation of this phenomenon is due to the existence of high temperatures in the panification roasters. In these roasters, the vegetative bacteria forms do not resist because they are all destroyed. The germs discovered in bread and rolls represent the vegetative forms

of bacteria spores, which have germinated after getting the bread out of the roaster.

In order to determine the number of coliforms germs, the environment used for their culture was colony – lactose - lauryl sodium sulfate, with small Durham pipes.

In table 2 is presented the content in coliform germs from the six analyzed flour tests.

Table 2. The number of coliform germs from the flour tests.

| Analyzed tests | Number of coliform germs/gram | | |
|----------------|-------------------------------|-------|-------|
| | flour | bread | rolls |
| F ₁ | 44 | 2 | 1 |
| F ₂ | 53 | 1 | 1 |
| F ₃ | 46 | 0 | 0 |
| F ₄ | 64 | 1 | 1 |
| F ₅ | 20 | 0 | 0 |
| F ₆ | 34 | 0 | 0 |

It may be noticed that in the case of bread and rolls, the number of coliform germs is extremely reduced, 1 - 2 germs/gram, for the panification products taken from F₁, F₂ and F₄ tests while for the panification products taken from F₃, F₅ and F₆ flour tests, the number of coliform germs is 0. So, it could be say that the presence of the coliform germs on this kind of alimentary products is the consequence of contamination which appears after the baking procedure, because, coliform germs being asporulated and acapsulated, they don't resist to so high temperatures and are entirely destroyed in the baking process. The contamination with coliform germs of the final products (bread, rolls) follows the baking process and the germ *Escherichia Coli* and *Proteus mirabilis* have human provenience. Their presence indicates a recent contamination.

Also there was analyzing the products by determining the presence and the number of germs belonging to *Bacillus mesentericus*. Following the specified working technique it have been reached the results from the table 3, in the case of the six flour tests for bread and rolls made from flour.

Table 3. The numerical variations of *Bacillus mesentericus* germ in flour, bread and rolls.

| Analyzed tests | The number of <i>B.mesentericus</i> /gram | | |
|----------------|---|-------|------|
| | flour | bread | roll |
| F ₁ | 96 | 9 | 7 |
| F ₂ | 85 | 8 | 6 |
| F ₃ | 83 | 8 | 5 |
| F ₄ | 94 | 9 | 7 |
| F ₅ | 75 | 7 | 5 |
| F ₆ | 72 | 6 | 4 |

Because the *Bacillus cereus* is a sporulated germ, the spores resist at the bread's baking temperatures and that's why, if they are too many in flour, it is possible to find them also in the final products. In the table 4 are presented the values of this parameter that has been determined in the analyzed products – flour, bread and rolls.

Table 4. Number of *Bacillus cereus* germ found in flour, bread and rolls.

| Analyzed tests | The number of <i>Bacillus cereus</i> Mesentericus/gram | | |
|----------------|--|-------|------|
| | flour | bread | roll |
| F ₁ | 98 | 10 | 8 |
| F ₂ | 90 | 10 | 9 |
| F ₃ | 68 | 9 | 7 |
| F ₄ | 79 | 10 | 8 |
| F ₅ | 54 | 8 | 6 |
| F ₆ | 48 | 6 | 4 |

The last microbiological parameter analyzed was the total number of yeasts and fungi presented in table 5.

Analyzing the tables corresponding to the isolated types of microorganism could be noticed that the number of microorganism lowers progressively from the raw material towards the final product as a direct consequence of the different phases of the technological process which ends with the baking meaning the exposure at high temperatures.

The number of microorganism of each type lowers in the case of rolls in comparison with their registered number in the obtained bread, even if the raw material and the working conditions are identically, this phenomenon can be explained by the fact that the test size is reduced and temperatures inside the crumb is higher than inside the bread's crumb.

Table 5. The mycological load in flour, bread and rolls.

| Analysed tests | Number of yeasts and fungi/gram | | |
|----------------|---------------------------------|-------|-------|
| | flour | bread | rolls |
| F ₁ | 990 | 83 | 76 |
| F ₂ | 960 | 80 | 64 |
| F ₃ | 680 | 68 | 54 |
| F ₄ | 730 | 72 | 61 |
| F ₅ | 520 | 58 | 47 |
| F ₆ | 430 | 49 | 41 |

Conclusions

In all the tests analyzed, the flour samples, bread and panification products, were from the microbiological point of view, in the predicted limits of the present legislation. In order to prevent the contamination that follows the production of the final product, it's necessary for the hygienic norms and conditions imposed by the legislation for the storage of the panification products to be fulfilled. In the panification technological process it may be noticed that the final products have a much lower mycological load than the raw material. In order to obtain a qualitative panification products it is necessary for the microbiological parameters to be subscribed in the legislation limits.

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