

Microbiological quality of confectionery products

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Abstract

The Consumers are taking unprecedented interest in the way food is produced, processed and marketed, and are increasingly calling for producers to accept greater responsibility for food safety and consumer protection. Confidence in the safety and integrity of the food supply is an important requirement for consumers. Foodborne disease outbreaks involving agents such as *Escherichia coli*, *Salmonella*, *Bacillus cereus* and chemical contaminants highlight problems with food safety and increase public anxiety that modern farming systems, food processing and marketing do not provide adequate safeguards for public health. Effective national food control systems are essential to protect the health and safety of domestic consumers. In order to determine the efficiency of the HACCP system I monitored, two confectionery units, during June 2007 and August 2009, in the city area of Orăştie, Hunedoara county, the technological flow in the critical points that assure the prevention of contamination and elaboration of good quality products.

Keywords: microbiological quality, confectionery products, consumer protection, HACCP system

1. Introduction

Factors which contribute to potential hazards in confectionery include improper agricultural practices; poor hygiene at all stages of the food chain; lack of preventive controls in confectionery processing and preparation operations; misuse of chemicals; contaminated raw materials, ingredients and water; inadequate or improper storage, etc. [1]

Due to the chemical composition rich in nutrients and high humidity, the cakes are favorable environments for the development of microorganisms. Therefore, respecting the steps of technological process, specific to each group of cakes and respecting the working parameters (time, temperature, relative air humidity) will

ensure the attainment of healthy products which do not endanger to consumers’ health.

2. Material and methods

The methods used for determining the microbiological analysis products (presence of *Escherichia coli*, *Salmonella* species, *coagulase-positive Staphylococcus*) and determining the total number of germs (NTG), coliforms bacteria, the total number of yeasts and molds (YM) using sanitation tests of, are official methods, commonly used in Food microbiology laboratory. The data obtained were statistically processed for objective assessment of food safety in the area monitored. Have been

developed findings and recommendations on the quality of such food.

3. Results and Discussion

Results of microbiological investigations performed in unit A are presented in Table 1:

In the graphical representation we estimated the value TNMAG with a 95% (amount varies by $\pm 5\%$).

Comparing the graphics there can be observed higher values of TNMAG during summer season, from June to August.

Table 1. Summary - products in drive A

| No. | Cakes with cream | Microbiological parameters | | | | | TNMAG [4] |
|-----|---|-----------------------------|-----------------------|---------------------------------------|------------------------|---------------------|---------------------|
| | | Salmonella [3] | Coliform Bacteria [4] | Coagulase-positive Staphylococcus [5] | E. coli [6] | Bacillus cereus [7] | |
| | Referential | SR EN ISO 6579/2003 AC/2006 | SR EN ISO 4831/2006 | SR EN ISO 6888/1/2002 AC/2005 | SR ES ISO 16649/2/2001 | SR EN ISO 7932/2005 | SR EN ISO 4833/2003 |
| | Reference Microbiological Conditions | absent | 10 | 1 | 1 | 1 | 100.000 |
| | Cakes cream | | | | | | |
| 1. | Caraiman | abs/25g | abs/0,1g | abs/g | abs/g | abs/g | 0 + 28000/g |
| 2. | Caramel | abs/25g | abs/0,1g | abs/g | abs/g | abs/g | 0 + 28000/g |
| 3. | Chocolate Cake | abs/25g | abs/0,1g | abs/g | abs/g | abs/g | 0 + 28000/g |
| 4. | Diplomat | abs/25g | abs/0,1g | abs/g | abs/g | abs/g | 0 + 24000/g |
| 5. | Eclair | abs/25g | abs/0,1g | abs/g | abs/g | abs/g | 0 + 8500/g |
| 6. | Excellent | abs/25g | abs/0,1g | abs/g | abs/g | abs/g | 0 + 24000/g |
| 7. | Savarin | abs/25g | abs/0,1g | abs/g | abs/g | abs/g | 0 + 28000/g |
| 8. | Fruit tarte | abs/25g | abs/0,1g | abs/g | abs/g | abs/g | 0 + 12800/g |

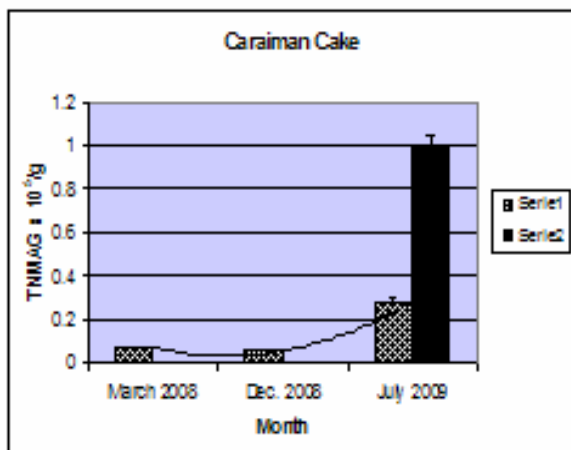


Fig. 1: TNMAG – Caraiman Cake

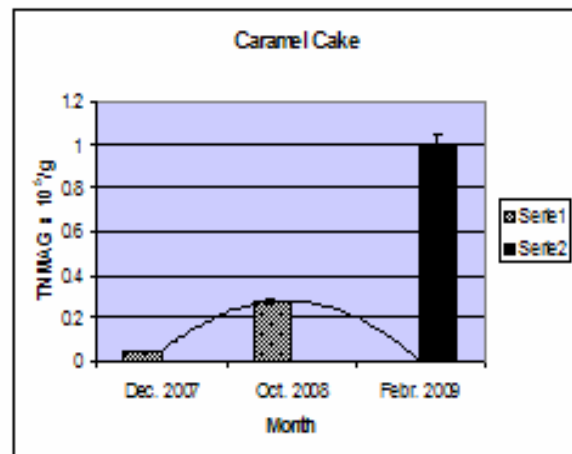


Fig. 2: TNMAG – Caramel Cake

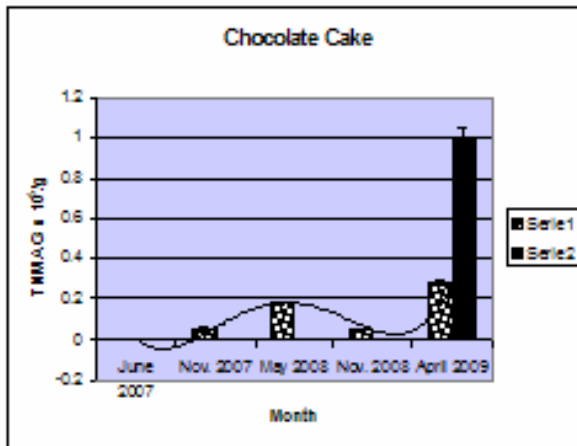


Fig. 3: TNMAG – Chocolate Cake

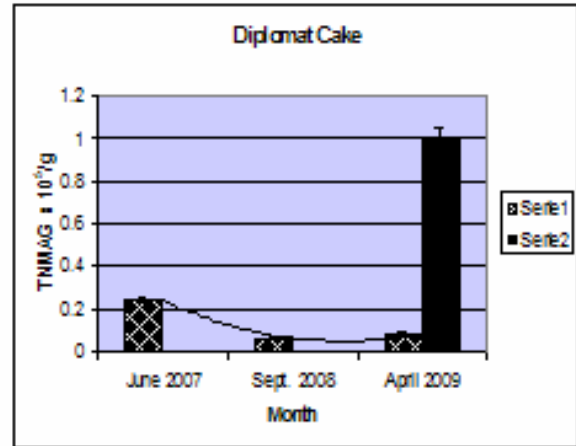


Fig. 4: NTGAM – Diplomat Cake

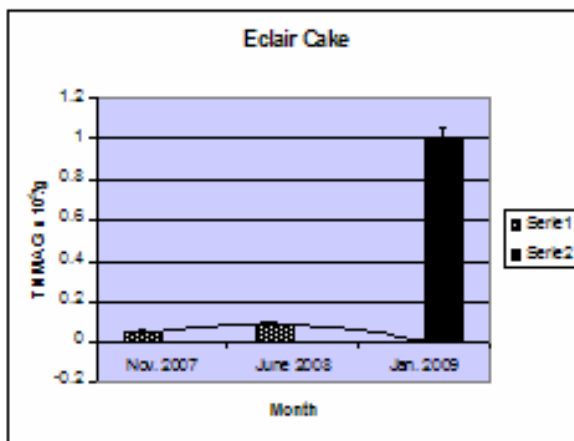


Fig. 5: TNMAG – Eclair Cake

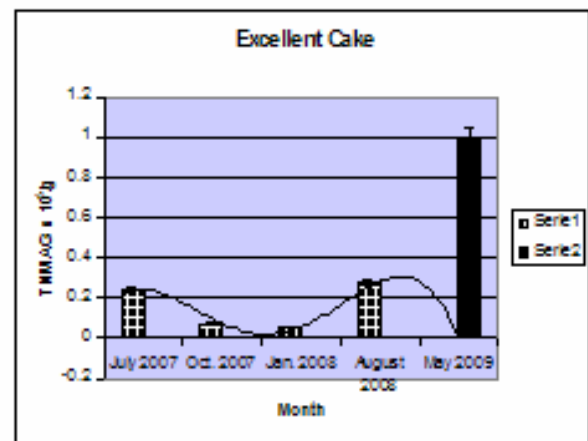


Fig. 6: TNMAG – Excellent Cake

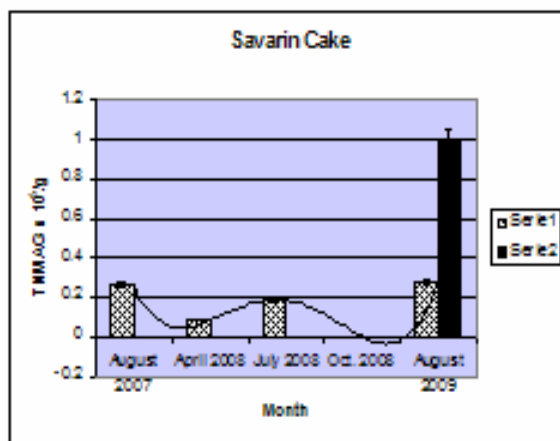


Fig. 7: NTGAM – Savarin Cake

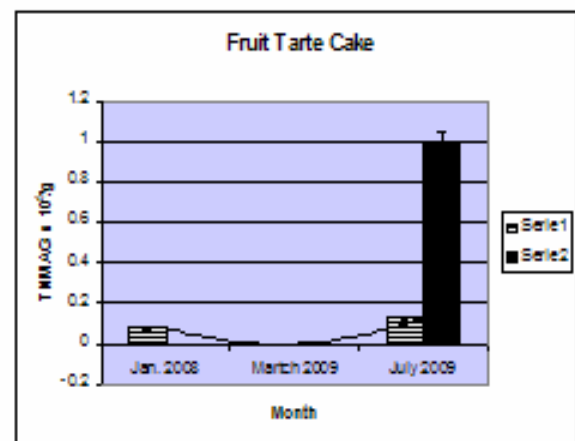


Fig. 8: NTGAM – Fruit Tarte Cake

Table 2. Summary - products in drive B

| No. | Cakes with cream | Microbiological parameters | | | | | |
|-----|---|-----------------------------------|-----------------------------|---|-------------------------------|---------------------------|------------------------|
| | | Salmonella [3] | Coliform Bacteria [4] | Coagulase-positive Staphylococcus [5] | E. coli [6] | Bacillus cereus [7] | TNMAG [4] |
| | Referential | SR EN ISO 6579/2003 AC/2006 | SR EN ISO 4831/2006 | SR EN ISO 6888/1/2002 AC/2005 | SR ES ISO 16649/2/ 2001 | SR EN ISO 7932/2005 | SR EN ISO 4833/2003 |
| | Reference Microbiological Conditions | absent | 10 | 1 | 1 | 1 | 100.000 |
| | Cakes cream | | | | | | |
| 1. | Boema | abs/25g | abs/0,1g | abs/g | abs/g | abs/g | 0 ÷ 28000/g |
| 2. | Chocolate Cake | abs/25g | abs/0,1g | abs/g | abs/g | abs/g | 0 ÷ 28000/g |
| 3. | Eclair | abs/25g | abs/0,1g | abs/g | abs/g | abs/g | 0 ÷ 12400/g |
| 4. | Exotic | abs/25g | abs/0,1g | abs/g | abs/g | abs/g | 0 ÷ 26000/g |
| 5. | Monique | abs/25g | abs/0,1g | abs/g | abs/g | abs/g | 0 ÷ 24000/g |
| 6. | Savarin | abs/25g | abs/0,1g | abs/g | abs/g | abs/g | 0 ÷ 28000/g |

The values determined by microbiological analysis are below the accepted standard limits, showing the need of improving measures for sanitary and hygiene conditions of premises and working equipments, storage spaces for raw materials and finite goods, for staff, quality of materials and auxiliaries.

Trend line marks the change in time of TNMAG for all sorts of cakes that have been analyzed. Results of microbiological investigations carried out in unit B are shown in the following table. (Table 2)

Microbiological charge of the creamy cakes on the total number of mezophyl aerobic germs, in drive B is shown in the following graphics. (Fig. 9 - 14)

Microbiological charges of cakes filled with cream on the total number of mezophyl aerobic germs (TNMAG) have values within the limits of admissibility, which shows that:

- ✓ the conditions of hygiene in production areas and storage areas have been followed;
- ✓ good quality raw and auxiliary materials were used;
- ✓ the technological process was successfully complied;

- ✓ during working hours, the staff met mandatory health and hygiene rules.

In the graphical representation we estimated the value TNMAG with a 95% (amount varies by ± 5%).

Comparing graphics there can be observed higher values in NTGAM during the summer season (from June to August), high temperatures favoring the rapid development of microorganisms and degradation in cakes. Trend line marks the change in time of TNMAG for all sorts of cakes analyzed.

Assortment of cakes Chocolate Cake, Eclair with vanilla cream and Savarin are prepared both in drive A and in drive B. Medium TNMAG values presented in Table 3, were graphically processed (Fig. 15.) Analyzing the graphic can be observed higher NTGAM values for all the cakes prepared in unit B compared with the same assortment of cakes prepared in unit A.

TNMAG medium values are substantially equal for Chocolate cakes and Savarin, average charge being 5.83% and 3.90% higher in the cakes of unit B compared with those of unit A. TNMAG higher differences were recorded for Éclair with vanilla cream, the average value being 46.16% higher in the cakes of unit B, compared with those of unit A.

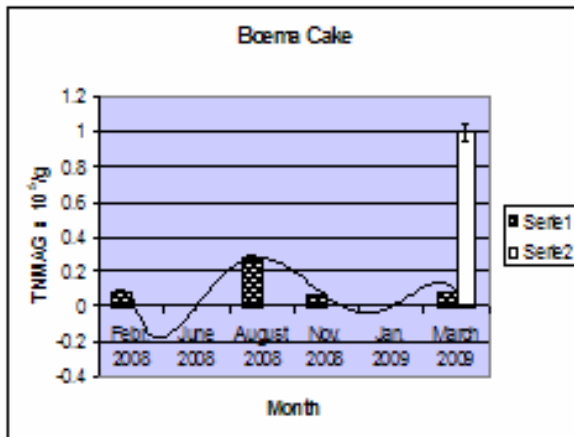


Fig. 9: TNMAG – Boema Cake

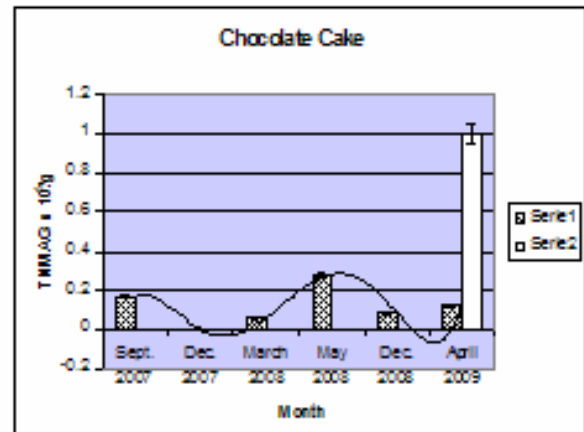


Fig. 10: TNMAG – Chocolate Cake

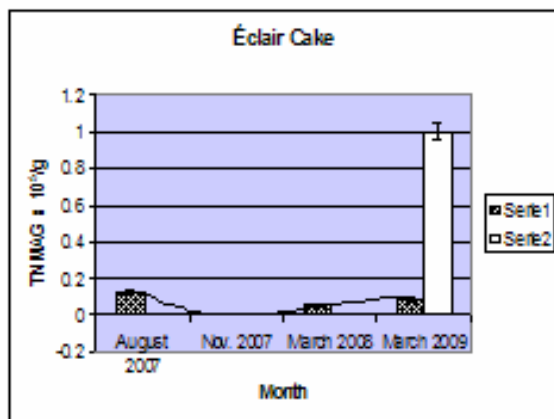


Fig. 11: TNMAG – Éclair Cake

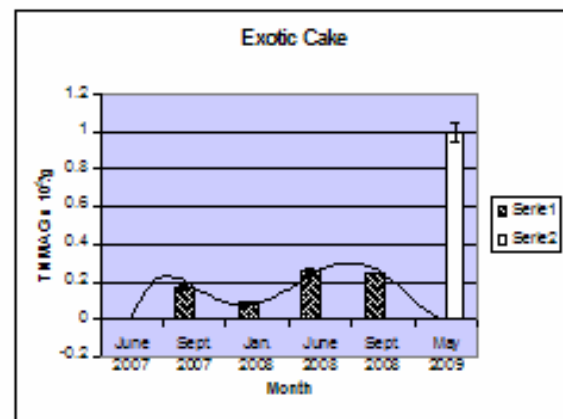


Fig. 12: TNMAG – Exotic Cake

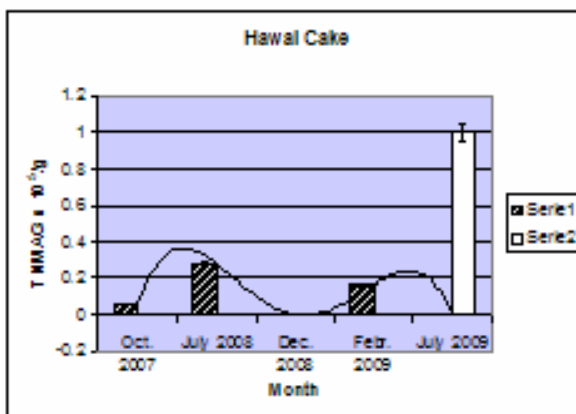


Fig. 13: TNMAG – Monique Cake

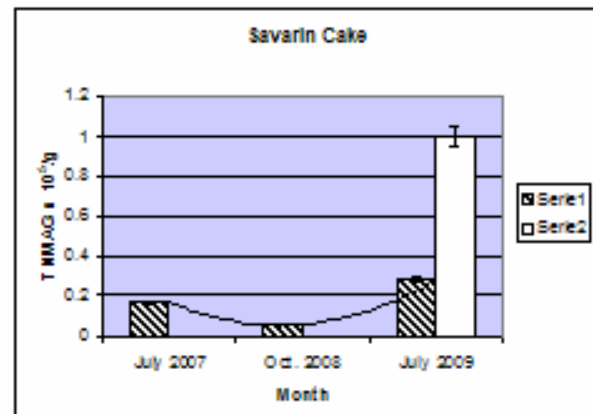


Fig. 14: TNMAG – Savarin Cake

Table 3. TNMAG values - cakes prepared in unit A and unit B

| Cakes | Medium TNMAG /gvalue | |
|----------------|----------------------|----------|
| | Unit A | Unit B |
| Chocolate Cake | 11260 | 11916,67 |
| Eclair | 4566,67 | 6675 |
| Savarin | 16200 | 16833.33 |

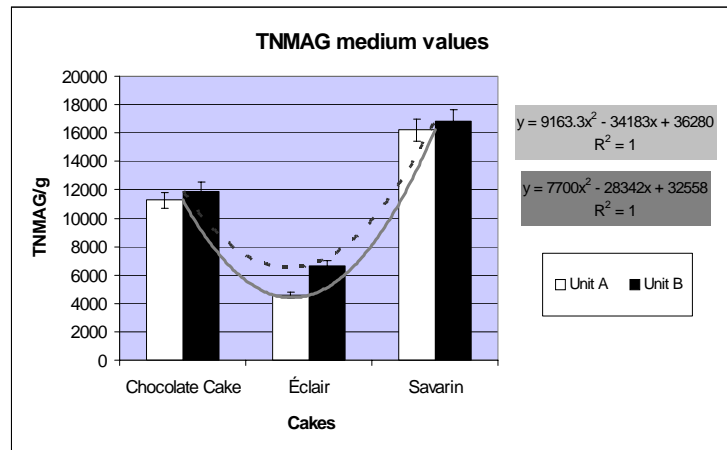


Figure 15: TNMAG medium values of cakes prepared in unit A and unit B

The causes for a larger charge of TNMAG may be determined by:

- improper cleaning of equipment and premises;
- hygiene non-compliance by the staff of unit B;
- the usage of raw materials and auxiliary nonetheless qualitatively;
- failure of technological flow compliance;
- improper storages conditions of temperature and relative air humidity of raw materials for finished products or half-baked products.

Points to check:

- ✓ the formality of the staff establishment to the rules of personal hygiene, working hygiene, periodic monitoring of health;
- ✓ rotation of raw and auxiliary materials stocks to avoid exceeding the validity, ensuring traceability of raw materials and changing suppliers in case of repeated failure to provide good quality products;

- ✓ compliance sequencing and working parameters during the course of technological process;
- ✓ cleaning storage areas for raw materials and finished goods storage;
- ✓ respecting the space and microclimate parameters: temperature, relative humidity of air and respecting the microclimate parameters: temperature, air relative humidity;
- ✓ reviewing the sanitation plan and accountability of personnel for performing cleaning and sanitation of the controlling process.

4. Conclusions

Needless to say, food is essential for our lives and safety should come first. Food hygiene is a classic issue in the public health programme, and today it is still a globally significant issue.

Responsibility for food safety is shared by everyone involved with food from production to consumption, including growers, processors, regulators, distributors, retailers and consumers.

The results prove that:

- as part of a managerial job requirement, HACCP system operates as a possibility of prevention before the risk factors may act influencing the products and consumers' health;
- the determined microbiological conditions proves the HACCP conditions have been improved and the measures are compliant in the units, showing a big concern for the clients safety and high quality products;
- consumers' satisfaction regarding food safety protects the business and reputation of a company.

References

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