

USEFUL MICROBIOLOGICAL TESTING OF CONFECTIONERY PRODUCTS QUALITY

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Keywords: confectionery products, HACCP system, microbiological quality, total number of mezophyl aerobic germs TNMAG, consumer protection.

Abstract: The control of raw materials, processing and environment are critical factors in the prevention of microbial contamination in confectionery. Confidence in the safety and integrity of the food supply is an important requirement for consumers. (Doyle, 2000) Food-borne disease outbreaks involving agents such as *Escherichia coli*, *Salmonella*, *Bacillus cereus*, *Staphylococcus*, *Listeria* 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. Constant surveillance and good manufacturing practice are the best methods for prevention of contamination. The paper presents the monitoring of two confectionery units, during June 2007 to August 2009, in the city area of Focșani, Vrancea county.

INTRODUCTION

Due to the chemical composition rich in nutrients and high humidity, the confectionery products are favourable environments for the development of micro-organisms. 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.

The main objectives of confectionery control system are to:

- i) protect public health by reducing the risk of food-borne illnesses;
- ii) protect consumers from unsanitary, unwholesome, mislabelled or adulterated products; (Gilles, 2004) and
- iii) contribute to economic development by maintaining consumer confidence in the food supply.

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. (FAO/WHO, 2003; FAO, 2004)

MATERIALS AND METHODS

The methods used for determining the microbiological analysis products (presence of *Escherichia coli*, *Salmonella* species, coagulase-positive *Staphylococcus*, *Bacillus cereus*, *Listeria*, total number of mezophyl aerobic germs TNMAG) 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.

RESULTS AND DISCUSSIONS

Results of microbiological investigations performed in unit A and unit B, presence of *Escherichia coli*, *Salmonella*, coagulase-positive *Staphylococcus*, *Bacillus cereus*, *Listeria* are absent for all creamy cakes investigated.

Medium values of total number of mezophyl aerobic germs (TNMAG) of cakes prepared in unit A are shown in Table 1:

Table 1. TNMAG medium value - cakes unit A

No.	Cakes with cream	TNMAG/g medium value
1.	Caraiman	13633.33
2.	Caramel	10866.67

3.	Chocolate Cakes	11260
No.	Cakes with cream	TNMAG/g medium value
4.	Diplomat	13033.33
5.	Éclair	4566.667
6.	Excellent	12980
7.	Lemon	10060
8.	Pralin	10933.33
9.	Savarin	16200
10.	Fruit Tarte	6800
11.	Tosca	9575

The total number of mezophyl aerobic germs (TNMAG) medium value has been calculated for each product, and resulted the radar chart (Fig. 1.).

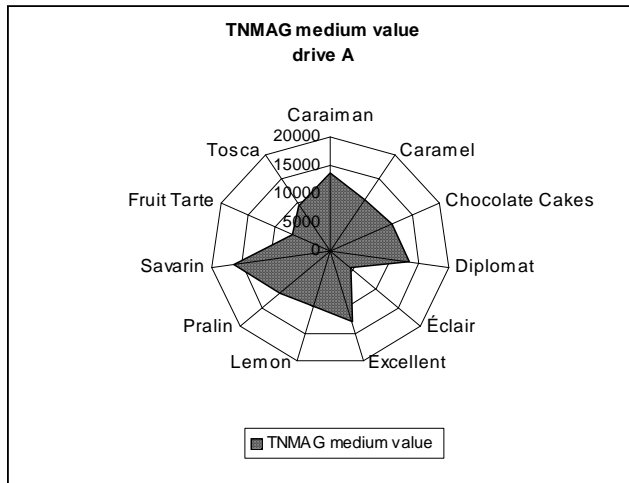


Fig. 1. TNMAG medium value – creamy cakes unit A

From the analysis of the radar graphic can be observed higher medium values of TNMAG for Savarin and Diplomat cake, cakes with whipped cream, Caraiman and Excellent cakes, candied in chocolate cakes - types that are generally more easily perishable.

The lowest average values for TNMAG are for Éclair cake with vanilla cream and Fruit Tarte. These cookies have as floury basis the shells from scalded dough, more exactly the shells of pastry tarts that do not saturates, the shells' humidity is very low, while moisture cream milk is higher than the moisture of whipped-based cream and fat-based cream, but for these cakes the sponge cake is being saturated with sirup contributing to the increasing of the total moisture of the finished product, thus creating a favorable environment for the development of micro-organisms.

From the analysis of radar graphic it can be observed average TNMAG values higher for Savarin cake, whipped cream cookies and Chocolate cakes and Excellent, chocolate glacé cakes.

The medium value of total number of mezophyl aerobic germs (TNMAG) of cakes prepared in unit B are presented in the following table. (Table 2)

Table 2. TNMAG medium value - cakes unit B

No.	Cakes with cream	TNMAG/g medium value
1.	Boema	9116.67
2.	Chocolate Cakes	11916.67
3.	Éclair	6675
4.	Exotic	12533.33
5.	Hawai	10020
6.	Monique	8566.667
7.	Savarin	16833.33

Medium values of NTGAM presented in Table 2, were graphically shown in Fig. 2.

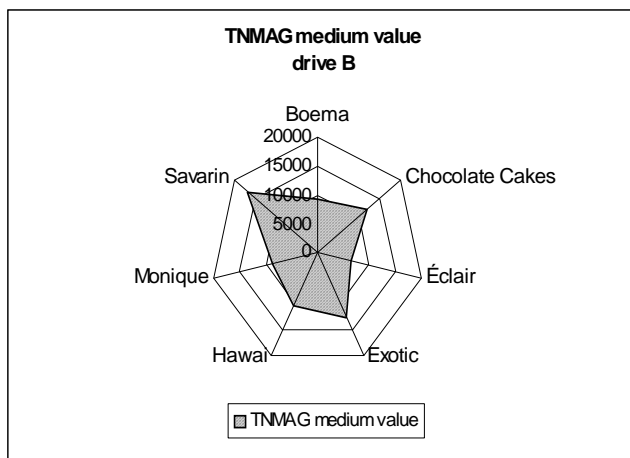


Fig. 2. Medium value of TNMAG – creamy cakes unit A

The lowest average values for NTGAM are in Éclair cake with vanilla cream.

The medium increased NTGAM values recorded for Savarin cake may be due to high microbial loading and air (TNG and YM) recorded in unit B. The air bubbles embedded in fine form during the preparation of the cream used as packing in the cake, having a large microbiological load can affect in a negative way the microbiological quality of the Savarin cake. Therefore, hygienic quality of equipments and utensils, including the air condition from production and storage facilities may be a risk factor for product safety, the need to respect hygiene rules being obvious.

Assortment of Chocolate Cakes, Éclair with vanilla cream and Savarin cakes are prepared both in drive A and in drive B. Medium values of TNMAG presented in Table 3, were graphically processed (Fig. 3)

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

No.	Cakes with cream	TNMAG/g medium value	
		Unit A	Unit B
1.	Chocolate Cakes	11260	11916.67
2.	Éclair	4566.67	6675
3.	Savarin	16200	16833.33

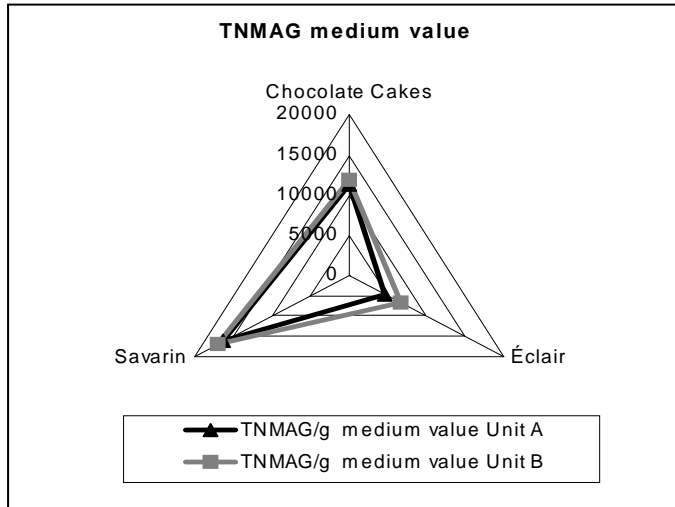


Fig. 3. TNMAG medium values of cakes prepared in unit A and unit B

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.

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 microclimate parameters: temperature, air relative humidity;
- ✓ reviewing the sanitation plan and accountability of personnel for performing cleaning and sanitation of the controlling process.

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 program, 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 of monitoring 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.

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