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Study of biochemical physico-chemical characteristics and microbiological quality of processed cheese portion Okid's

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Abstract
The melting cheese is product witch is obtained from the mixture of original (pure) chesses and different ripening with melting salts and eventually other ingredients. As this product is highly required by consumers and is available in the market, we show our interest to it during the different stages of its process. First, to evaluate the physicochemical elements such as: fat, the whole dry extract and humidity. In the second step to evaluate the microbiological. The microbiological and physic-chemical analysis reveals that the product “melting cheese O’kids” manufactured by the Goumidi company compliance with national standards of raw materials and finished product. This compliance makes from the finished product a good microbiological quality.

1. Introduction

Milk, its composition is a food choice: it contains fat, lactose, proteins, minerals, vitamins, and 87% water [1].

In Algeria, the import of milk powder increased in recent times, due to population growth and inadequate domestic production. Even if a non-stress negligible deployed to stem the importation by encouraging the development of dairy cattle, it is not the same with other productions from dairy species such as goat, sheep, camel and which are particularly adapted to our harsh agro Conditions climatic and whose hardiness is always appreciated [2] .

Generally, the cheese is made from a mixture of different traditional cheeses, often refined and selected for their flavor, their maturity and more generally their ability to cast [2] .

At the beginning of industrialization, the cast was mostly used to allow recovery of cheeses with defects in workmanship and cheese had damaged the destination [3] .

The processed cheese is now a thriving industry, in terms of taste, quality, texture and composition range of cheese.

Algeria is the first consumer dairy products Maghreb in 2004 to an estimated 1.7 billion liters annual market growth rate of 8% and an average consumption of about 100 to 110 liters / habitat / year, consumption is still increasing steadily and is expected to reach at least 115 liters / habitat / year. In 2010, dairy products occupy a prominent place in the structure of imports since they having almost 20% of global food factor [4].

To have a concrete idea of the organization of surveillance and control of the

quality of a food product, we conducted a three-month internship in the unity of the cheese GOUMIDI Ouled-Yaich, Blida.

The purpose of our study was to determine the microbiological and physicochemical quality of processed cheese "OKIDS" on the raw material (milk powder, butter, Cheddar, water) to finished product (melted cheese portion) and the determination of the different sources of contamination during the manufacturing process by an additional control personal hygiene, Surface and ambient atmosphere.

2. Material and Methods

Our work was done in the company Goumidi during a period from 01 March to 4 June 2012 to conduct a microbiological control and physicochemical melted cheese O'kids.

Table 1.1. *Germs sought in microbiological control personnel, air and surface with the media used and incubation conditions.*

Samples	Want germs	Culture media	Temperature ° C and Incubation Time
personal	- Total coliforms	-Désoxycolate	37°C/48 hours
	- Fecal coliform	-Désoxycolate	44°C/48 hours
	-*S. aureus*	-Chapman	37°C/48 hours
ambient air	- Total bacteria.	- PCA	30°C/ 72 hours
	-Yeast and mold	-Sabouraud	22°C/5days
surface	- Total coliforms	-Désoxycolate	37°C/48hours
	- Fecal coliform	-Désoxycolate	44°C/48hours
	- Yeast and mold	-Chapman	37°C/48hours
	-*S. aureus*	-Sabouraud	22°C/5 days

The table 1.2 gives us the physico-chemical analyzes made during our experiment

Table 1.2. *Physico-chemical analyzes performed on different samples.*

Samples	TDE %	MG % (Butterfat)	Humidity %	Fat /dry %
Milk powder	+	+	+	-
Cheddar	+	+	+	-
Butter	+	+	-	-
Ongoing Production	+	+	-	-
End product	+	+	+	+

TDE: Total dry extract

2.1. Sampling of Finished Product (Cheese)

It is carried out directly by randomly removing the medium side and the top and bottom of the box pallet 5 16 cheese portions.

2.2. Sampling for Microbiological Air Monitoring

These samples have a great interest in industry is done by exposing rooms in Petri dishes containing agar medium and which is opened, in particular at locations allowing entry of air or those exposed to air currents [5] .

2.3. Levy for Microbiological Control Surfaces

They allow the study of the flora present on the manufacturing or storage, worktops, walls and floors of the premises and possibly the hands of staff [5].

Among the methods used were swabbing: This method has the advantage of allowing withdrawals in inaccessible places as well as on flat surfaces. A cotton wool swab is placed in a test tube (Cotton plugged portion downwardly) and sterilized. Sampling is done by friction follows a well-defined surface [5].

2.4. Sampling for Microbiological Control Personnel

For this type of control the person examined pose those fingers in petri dishes containing agar media Chapman Search *Staphylococcus aureus* and désoxycolate 1.p1000 Search total and fecal coliforms.

Boxes Chapman incubated at 37 ° C/48 hours.

A box désoxycolate 1.p1000 44 ° C/48 hours to search for Faecal Coliforms.

A box désoxycolate 1.p1000 at 37 ° C for 48 hours in the search for total Coliforms.

2.5. Microbiological Analyzes

Table 1.3. *Germs sought in the different samples used medium and conditions of incubation.*

Microorganisms	Culture medium	Incubation conditions
total bacteria	PCA	30°C/72 h
total coliforms	-Désoxycholate -VBL	37°C/48 h
fecal coliforms	-Désoxycholate -VBL - BCPL	44°C/48 h
faecal streptococci	Rothe	37°C/ 24 h
Sulphite-reducing clostridia	Viande foie	37°C/48 h
Staphylococcus aureus	Baird-parker	37°C/ 24 à 48 h
Yeasts and molds	Sabouraud	22°C/ 5 jours
	-EPT	-Pré-enrichissement: 37°C/24h
	-Bouillon sélénite sodium	-Enrichissement: 37°C/24 h
	-Hektoen	-Isolement: 37°C/24 h

3. Results and Discussion

3.1. Microbiological Analyzes

Table 2.1. *Results of microbiological analysis of milk powder.*

	1st Day	2nd Day	Trd Day	fourth Day	Fifth Day	Standards JORA
total bacteria	00	2.10^2	10	00	00	2.10^5 seeds /g
coliforms totals	00	00	00	00	00	10 seeds /g*
fecal coliforms	00	00	00	00	00	1 seeds /g
Sulfite-reducing clostridia	Abs	Abs	Abs	Abs	Abs	Absence
S. aureus	Abs	Abs	Abs	Abs	Abs	Absence
yeast and mold	00	2 UFC	00	00	00	50 UFC*

* Standards set by the company.

3.1.1. Microbiological Testing of Materials Used in the Manufacture of Processed Cheese Slice

3.1.1.1. Milk Powder

The results of physicochemical analyzes of powdered milk 0% fat are summarized in Table 2.1.

The results show the total absence of indicators of fecal contamination and the absence of pathogens, namely: CSR and *S.aureus* which according [6], ingestion cause foodborne illness. In addition, we note the presence of GAM and yeast and mold in the second day it is probably due to contamination during collection and / or handling, however their charge remains substandard. Moreover the absence of yeasts and molds although tolerated by the standards leads us to say that the storage conditions are good. So milk powder 0% used as raw material is of good microbiological quality according [7], low water activity characterizing powder milk reduces or inhibits microbial growth and the product is microbiologically stable as it remains dry.

Table 2.2 includes the results of microbiological analyzes of Cheddar.

Table 2.2. *Results of the microbiological analysis of cheddar*

	1st Day	2nd Day	Trd Day	fourth Day	Fifth Day	Standards [8],
Sulfite-reducing *Clostridia*	Abs	Abs	Abs	Abs	Abs	Absence*
S. aureus	Abs	Abs	Abs	Abs	Abs	Absence

* Standards set by the company.

The results of microbiological analyzes of 5 samples of cheddar indicate the total absence of pathogenic germ: Sulfite-reducing *Clostridia* and *Staphylococcus aureus*, which gives full compliance with the standards set by the [8], and the standards set by the company Goumidi.

In conclusion, the cheddar used is of good microbiological quality.

3.1.1.2. Butter

The results of microbiological tests on butter are shown in Table 2.3.

Table 2.3. *Results of microbiological analyzes of butter*

	1st Day	2nd Day	Trd Day	fourth Day	Fifth Day	Standards [8],
total bacteria	00	00	00	00	00	100 seeds /g
Coliforms totals	00	00	00	00	00	10 seeds /g
Sulfite-reducing *Clostridia*	Abs	Abs	Abs	Abs	Abs	Absence*
S. aureus	Abs	Abs	Abs	Abs	Abs	Absence
Yeast and mold	Abs	Abs	Abs	Abs	Abs	Absence

* Standards set by the company.

From these results we find:

- An absence of pathogens: *S. aureus* and sulfite-reducing *Clostridia*.
- A lack of total germs.
- An absence of coliforms.
- An absence of yeasts and molds.

All the results obtained on the five samples are compliant, so the butter used has good quality microbiologically.

3.2. Microbiological Analysis of Cheese Production Runs

3.2.1. Cheese after Sterilization

The results of microbiological analysis of molten ensure sterilization treatment cheese are shown in Table 2.4.

Table 2.4. *Results of microbiological analyzes of cheese-making in court after sterilization.*

	1st Day	2nd Day	Trd Day	fourth Day	Fifth Day	standards[8]
total bacteria	00	00	00	00	00	100 seeds /g*
coliforms totals	00	00	00	00	00	100 seeds /g
fecal coliforms	00	00	00	00	00	10 seeds /g
Sulfite-reducing *Clostridia*	Abs	Abs	Abs	Abs	Abs	Absence
S. aureus	Abs	Abs	Abs	Abs	Abs	10 seeds /g
Yeast and mold	Abs	Abs	Abs	Abs	Abs	Absence *

* Standards set by the company.

From the results obtained in five manufacturing we find:

- A total absence of total coliforms and germs.
- An absence of pathogens: *Staphylococcus aureus* and Clostridium sulfite-reducing.
- Complete absence of yeasts and molds.

The results give a perfect compliance. And it indicates the correct heat treatment used during sterilization.

3.3. Finished Product

The table 2.5 presents the results of microbiological testing of the finished product (cheese) on five samples.

Table 2.5. *Results of microbiological analyzes of the finished product.*

	1st Day	2nd Day	Trd Day	fourth Day	Fifth Day	Standards [8]
total bacteria	00	00	00	00	00	100 seeds /g*
coliforms totals	00	00	00	00	00	100 seeds /g
fecal coliforms	00	00	00	00	00	10 seeds /g
Sulfite-reducing *Clostridia*	Abs	Abs	Abs	Abs	Abs	Absence
S. aureus	Abs	Abs	Abs	Abs	Abs	10 seeds /g
salmonella	Abs	Abs	Abs	Abs	Abs	Absence
Yeast and mold	Abs	Abs	Abs	Abs	Abs	Absence *

* Standards set by the company.

In all fabrications we see a total absence of germs sought and counted by the standards of [8] and those set by the company.

This compliance is due to the good quality of raw materials, their preservation, cleanliness of the equipment used and the smooth preparations.

It appears from these results that the cheese manufactured by the industry is Goumidi good microbiological quality.

3.3.1. Microbiological Analysis of Surface

3.3.1.1. Steaming

The table 2.6 includes the results of the microbiological analyzes of the surface of the ovens incubations: 22, 37, 44 ° C.

Table 2.6. *Results of microbiological analyzes of the surface.*

	1st Day			2nd Day			Trd Day			fourth Day			Standards [8]
	22°C	37°C	44°C	22°C	37°C	44°C	22°C	37°C	44°C	22°C	37°C	44°C	
total bacteria	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs*
coliforms totals	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs*
Sulfite-reducing *Clostridia*	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs*
S. aureus	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs*
Yeast and mold	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs	Abs*

3.4. Microbiological Analysis of Ambient Air

The results of the microbiological analysis of ambient air taken in the preparation room and raw materials at the laboratory are shown in Table 2.7.

Table 2.7. *Results of microbiological analyzes of ambient air.*

	1 st day		2nd day		Trd day		Fourth day		Fifth day		standards Goumidi
	A_1	A_2	A_1	A_2	A_1	A_2	A_1	A_2	A_1	A_2	
total bacteria	00	00	00	00	00	00	00	00	00	00	00 seeds
S. aureus	abs	abs	abs	abs	abs	abs	abs	Abs	Abs	abs	Absence
Yeast	00	00	00	00	00	00	00	00	00	00	00 seeds
mold	00	00	00	00	00	00	00	00	00	00	00 seeds

A_1: Living preparation of raw material.
A_2: Living analysis (laboratory).

The results of microbiological analyzes of air in two sensitive areas: preparation room of raw material and the laboratory, indicating:

- A total absence of total germs.
- An absence of pathogens: *Staphylococcus aureus*.
- Complete absence of yeasts and molds.

Conformity to standards set by the company is due to the use of air purifying respirators, and proper ventilation device which involves a dual role:

The provision of clean air in the workshop and disposal of contamination generated by staff.

According to [9]: "The ventilation also reduces condensation phenomena too often a source of contamination."

4. Conclusion

During the work done at the unit Goumidi (Ouled Yaich - Blida), the results for the control and the physico-chemical and microbiological analyzes carried out throughout the production chain from raw material to finished product show:

- A good microbiological and physico-chemical quality of raw materials, namely: powder milk, Cheddar, butter and water process: knowing that this water is treated chlorination and dechlorination and a decrease and regularization of Mg + + ions, we found that there's a good treatment and proper conduct of this water treatment.
- Good conduct UHT treatment, which makes the product stable even at extreme temperatures conservation.
- The results of physico-chemical and microbiological testing of finished product conform to due compliance with the manufacturing procedures (adherence assays, samples are thoroughly mixed and good hygienic quality).
- The personal hygiene by setting health facility instead of wiping hands disposable system, clean work clothing and ongoing awareness.
- The ventilation and isolation of each location and each stage of manufacture of cheese, closing windows, and use of disinfecting apparatus in ambient air.

These conditions will yield a good hygienic and

microbiological quality.

In addition, this study allowed us to follow the chain of processed cheese and UHT have knowledge in the field of quality control of food and know its importance to preserve the health of the population against diseases and food-borne infections and also to master the techniques used in microbiological testing laboratory.

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