



**Faculty of Veterinary Medicine
Department of Food Hygiene and Control**



Cairo University

Physicochemical, sensory and microbiological evaluation of Karish cheese sold in Cairo and its suburbs

Thesis Presented by

Ola Wagih Abd El moneim Hegab

(B.V.Sc., 2013 – Cairo University)

For the Degree of M.V.Sc

(Hygiene and Control of Milk and its products)

Under the supervision of

Prof. Dr. Ashraf Ahmed Moawad

Professor of Milk Hygiene and Control

Faculty of Veterinary Medicine

Cairo University

Dr. Eman Fathi Abd El-latif

Assistant Professor of Milk Hygiene and Control

Faculty of Veterinary Medicine

Cairo University

(2017)

Cairo University
Faculty of Veterinary Medicine
Department of Food Hygiene and Control

APPROVAL SHEET

This is to approve that thesis presented by: Ola Wagih Abd El Moneim Hegab

**Entitled: Physicochemical, sensory and microbiological evaluation of Karish
cheese sold in Cairo and its suburbs**

For the Degree of M.V.Sc. (Hygiene and Control of milk and its products)

APPROVAL COMMITTEE

Prof. Dr. Ali Ahmed Ali Bahout

Professor of milk hygiene and control and head of department
Faculty of Veterinary Medicine
Zagazig University

A. A. Bahout

Prof. Dr. Abeer Abd El Naser Awad Abd Elall

Professor of milk hygiene and control
Faculty of Veterinary Medicine
Cairo University

Abeer

Prof. Dr. Ashraf Ahmed Moawad

Professor of milk hygiene and control
Faculty of Veterinary Medicine
Cairo University

Ashraf

Dr. Eman Fathi Abd El-atif

Assistant Professor of milk hygiene and control
Faculty of Veterinary Medicine
Cairo University

Eman Fathi



**Faculty of Veterinary Medicine
Department of Food Hygiene and Control**



Cairo University

Supervision sheet

Prof. Dr. Ashraf Ahmed Moawad

Professor of Milk Hygiene and Control

Faculty of Veterinary Medicine

Cairo University

Dr. Eman Fathi Abd El-latif

Assistant Professor of Milk Hygiene and Control

Faculty of Veterinary Medicine

Cairo University

(2017)



**Faculty of Veterinary Medicine
Department of Food Hygiene and Control**



Cairo university

Name: Ola Wagih Abd El moneim Hegab

Date of birth: 24/10/1990

Place of birth: Cairo.

Nationality: Egyptian.

Degree: Master in Veterinary Medicine Sciences.

Specialty: Food Hygiene and control (Milk and its products).

Supervisors:

Prof. Dr. Ashraf Ahmed Moawad

Professor of Milk Hygiene and Control, Faculty of Veterinary Medicine, Cairo University.

Dr. Eman Fathi Abd El-latif

Assistant Prof. of Milk Hygiene and Control, Faculty of Veterinary Medicine, Cairo University.

Title of Thesis: Physicochemical, sensory and microbiological evaluation of Karish cheese sold in Cairo and its suburbs.

Abstract

Karish cheese is one of the most popular locally produced dairy products in Egypt. In this study seventy random samples of Karish cheese were collected from Cairo, Giza and Qaliubiya Governorates. Collected samples representing: 35 samples of Karish cheese made from raw milk (small scale production) collected from street vendors, the other 35 samples representing dairy plants with different trade names (large scale production) collected from supermarkets. The collected samples were examined microbiologically, chemically and organoleptically. The microbiological results indicated that aerobic bacteria, proteolytic bacteria, total staphylococci, yeast, mold, and coliforms were detected in different percentages and variable counts. On the other hand pathogens could be detected in small and large scale production. *Salmonella agona* was isolated from small scale production while *S. aureus* and *E.coli* were found in small and large scale production. The degree of acceptability of the examined samples Vs. Egyptian standards for Karish cheese was determined. The economic and public health significance as well as the suggestive preventive and control measures to monitor production of high quality and safe product were discussed.

Key words: Karish, Kareish, Kariesh cheese, *Salmonella agona*, *E.coli*, *S.aureus*, proteolytic, yeast and mould.

Dedication

To

Mother and Father

&

Brother and Sisters

&

My Husband Hamdy

Acknowledgement

First of all, prayerful thanks to ALLAH, for everything I have.

*No words can adequately express my sincere gratitude and great appreciation to my supervisor **Prof. Dr. Ashraf Ahmed Moawad**, Professor of Milk Hygiene and Control, Faculty of Veterinary Medicine, Cairo University, for his stimulating supervision, guidance, continuous encouragement, unfailing help and interest during supervising this work. Without his help and encouragement, this study would have never been completed.*

*I would like to express my thanks to my supervisor **Dr. Eman Fathi Abd El-latif**, Assistant Professor of Milk Hygiene and Control, Faculty of Veterinary Medicine, Cairo University, for her continuous help, advice and guidance throughout this study.*

It is great pleasure for me to express my thanks and gratitude to all members of Department of Food Hygiene and Control, for their continuous help and support.

Finally, I would like to thank my family, my husband & my friends for their love and support, and without them I could not achieve this work.

Contents

Subject	Page No.
Introduction	1
Review of Literature	5
Materials and Methods	18
Results	28
Discussion	59
Conclusion	78
Summary	80
References	85
Arabic summary	

List of Tables

Table no.	Title	Page
1.	Statistical analytical results of examined Karish cheese samples based on their aerobic plate count (APC, CFU/g).	28
2.	Frequency distribution of the examined Karish cheese samples based on their aerobic plate count (CFU/g).	29
3.	Statistical analytical results of examined Karish cheese samples based on their proteolytic count (PC, CFU/g).	30
4.	Frequency distribution of the examined Karish cheese samples based on their proteolytic count (CFU/g).	31
5.	Statistical analytical results of examined Karish cheese samples based on their yeast count (YC, CFU/g).	32
6.	Frequency distribution of the examined Karish cheese samples based on their yeast Count (CFU/g).	33
7.	Statistical analytical results of examined Karish cheese samples based on their mould Count (MC, CFU/g).	34
8.	Frequency distribution of the examined Karish cheese samples based on their mould count (CFU/g).	35
9.	Statistical analytical results of examined Karish cheese samples based on their total staphylococcal count (TSC, CFU/g).	36

List of Tables

10.	Frequency distribution of the examined Karish cheese samples based on their total staphylococcal count (CFU/g).	37
11.	Incidence of <i>Staphylococcus aureus</i> in the examined Karish cheese samples based on Coagulase test and Thermostable nuclease test.	38
12.	Statistical analytical results of examined Karish cheese samples based on their coliforms count (CC, MPN/g).	39
13.	Incidence of coliforms in the examined Karish cheese samples.	40
14.	Frequency distribution of the examined Karish cheese samples based on their coliforms count (MPN/g).	41
15.	Frequency distribution of isolated coliforms strains based on their biochemical identification (No. of isolates 105).	42
16.	Results of Serological identification of <i>E. coli</i> isolates based on slide agglutination test.	42
17.	Incidence of <i>salmonella</i> spp. in the examined Karish cheese samples based on their biochemical and serological identification (slide agglutination test).	45
18.	Overall microbiological profile of examined small scale Karish cheese samples (35 samples).	46
19.	Overall microbiological profile of examined large scale Karish cheese samples (35 samples).	47
20.	Statistical analytical results of examined Karish cheese samples based on their titratable acidity percentage.	49

List of Tables

21.	Frequency distribution of the examined Karish cheese samples based on their titratable acidity percentage.	50
22.	Statistical analytical results of examined Karish cheese samples based on their pH value.	51
23.	Frequency distribution of the examined Karish cheese samples based on their pH value.	52
24.	Statistical analytical results of examined Karish cheese samples based on their salt percentage.	53
25.	Frequency distribution of the examined Karish cheese samples based on their salt percentage.	54
26.	Statistical analytical results of examined Karish cheese samples based on their moisture percentage.	55
27.	Frequency distribution of the examined Karish cheese samples based on their moisture percentage.	56
28.	Degree of acceptability of examined Karish cheese samples vs. Egyptian Standards for Karish cheese (ES: 1008-4/ 2005).	57
29.	Statistical analytical results of examined large scale Karish cheese samples based on their organoleptic examination:	58

List of Figures

Figure no.	Title	Page
1.	Statistical analytical results of examined Karish cheese samples based on their aerobic plate count (APC, CFU/g).	28
2.	Frequency distribution of the examined Karish cheese samples based on their aerobic plate count (CFU/g).	29
3.	Statistical analytical results of examined Karish cheese samples based on their proteolytic count (PC, CFU/g).	30
4.	Frequency distribution of the examined Karish cheese samples based on their proteolytic count (CFU/g).	31
5.	Statistical analytical results of examined Karish cheese samples based on their yeast count (YC, CFU/g).	32
6.	Frequency distribution of the examined Karish cheese samples based on their yeast Count (CFU/g).	33
7.	Statistical analytical results of examined Karish cheese samples based on their mould Count (MC, CFU/g).	34
8.	Frequency distribution of the examined Karish cheese samples based on their mould count (CFU/g).	35
9.	Statistical analytical results of examined Karish cheese samples based on their total staphylococcal count (TSC, CFU/g).	36

List of Figures

10.	Frequency distribution of the examined Karish cheese samples based on their total staphylococcal count (CFU/g).	37
11.	Incidence of <i>Staphylococcus aureus</i> in the examined Karish cheese samples based on Coagulase test and Thermostable nuclease test:	38
12.	Statistical analytical results of examined Karish cheese samples based on their coliforms count (CC, MPN/g).	39
13.	Incidence of coliforms in the examined Karish cheese samples:	40
14.	Frequency distribution of the examined Karish cheese samples based on their coliforms count (MPN/g).	41
15.	Frequency distribution of isolated coliforms strains based on their biochemical identification for small and large scale samples.	43
16.	Frequency distribution of isolated coliforms strains based on their biochemical identification.	44
17.	Incidence % of salmonella spp. in the examined Karish cheese samples.	45
18.	Overall microbiological profile of examined small scale Karish cheese samples (35 samples):	48
19.	Statistical analytical results of examined Karish cheese samples based on their titratable acidity percentage.	49
20.	Frequency distribution of the examined Karish cheese samples based on their titratable acidity percentage.	50

List of Figures

21.	Statistical analytical results of examined Karish cheese samples based on their pH value.	51
22.	Frequency distribution of the examined Karish cheese samples based on their pH value.	52
23.	Statistical analytical results of examined Karish cheese samples based on their Salt percentage.	53
24.	Frequency distribution of the examined Karish cheese samples based on their Salt percentage.	54
25.	Statistical analytical results of examined Karish cheese samples based on their moisture percentage.	55
26.	Frequency distribution of the examined Karish cheese samples based on their moisture percentage.	56
27.	Degree of acceptability of examined Karish cheese samples vs. Egyptian Standards for Karish cheese (ES: 1008-4/ 2005).	57

Introduction

Cheese represents one of the most nutritionally complete foods in our diet. It is an excellent source of proteins, lipids and essential nutrients including calcium, phosphorus, vitamins and essential amino acids (**Ash and Wilbey, 2010**).

Karish cheese (also known as Kariesh or Kareish cheese) is one of the most popular locally produced dairy products in Egypt. The increasing demand of Karish cheese by consumers is mainly attributed to its high protein content and low price (**Osman *et al.*, 2010**). It is often recommended for persons suffering from obesity, arteriosclerosis and heart diseases contributing to its low fat and salt content. It is composed of 16.70% protein, 3.98% sugar, 72.50% water and 0.1% fat (**Abou-Donia, 2008**).

According to the **Egyptian Standards (1008-4/2005)** Karish cheese is defined as the fresh unripened soft cheese obtained from coagulation of skimmed fresh or concentrated milk or a mixture of fresh and powdered milk products, pasteurized or heat treated equivalent to pasteurization.

Manufacture of such traditional product is usually done by farmers using fresh whole milk which left undisturbed in earthenware jars, the fat rises to the surface and the partly skimmed milk beneath sours. After 24–36 hours, the cream layer is skimmed off and the clotted skimmed milk (Laban Rayeb) is poured on to reed mats. The pressed curd is permitted to drain and then salted. Increased demand of Karish cheese by the Egyptian consumers has been led to the commercial production of Karish cheese in dairy factories, under such conditions it is frequently made from pasteurized milk using starter culture (**Phelan *et al.*, 1993**).

Traditional method usually exposes the product to high level of contamination, raw milk contains 30% of undesirable organisms in total bacterial count hence; it requires great attention during production of such product (**Pazakova *et al.*, 2001**). The risk of contamination of the product

increased as it sold uncovered without container. Therefore, it can be considered as a good medium for growth of different types of spoilage and pathogenic microorganisms (**Yousef, 2007**).

The Large scale Karish cheese produced in dairy factories can be contaminated with different types of organisms which gaining access to the product from various sources, although pasteurization destroys potential pathogenic microorganisms, post pasteurization contamination, bad handing and bad storage can lead to the recontamination of the product (**Omar, 2006**).

Many previous studies showed that Karish cheese had high count of aerobic plate count, total staphylococcus count, yeast count, mould count, coliforms count and proteolytic count; meanwhile it may harbor significant foodborne pathogens like *E.coli*, salmonella and *Staphylococcus aureus*. Owing to these reasons the microbiological analysis is critical point for assessment quality and safety of small and large scale Karish cheese.

A useful indicator for assessing the overall quality and safety of a dairy product and monitoring the sanitary conditions applied during the production, collection, and handling is the aerobic plate count (APC). It is sole value to indicate the sanitary measures adopted during production, collection, handling, and storage environment (**ICMSF, 2009**).

Coliforms are the major spoilage organisms in cheese. They are members of the *Enterobacteriaceae* that ferment lactose such as the following species *Escherichia*, *Klebsiella* and *Enterobacter*. Coliforms found in dairy products that manufactured from raw milk as traditional Karish cheese due to fecal contamination or biofilms on milking equipment which contaminate the milk. While in pasteurized products it may be found due to post pasteurization contamination. Coliforms in cheese can multiply rapidly, when pH and temperature are favorable. This growth is often associated with the production of “yeasty,” “putrid,” “gassy,” and “unclean” off-flavors as well as the