شبكة المعلومات الجامعية

# بسم اللّه الرحمن الرحيم



# شبكة المعلومات الجامعية

# التوثيق الالكتروني والميكروفيلم

شبكة المعلومات الجامعية

# جامعة عين شمس

## التوثيق الإلكتروني والميكروفيلم

# قسم

## نقسم باللّه العظيم أن المادة التي تم توثيقها وتسجيلها علي هذه الأقراص المدمجة قد أعدت دون أية تغيرات

# يجب أن

## تحفظ هذه الأقراص المدمجة بعيدا عن الغبار

شبكة المعلومات الجامعية


# بعض الوثائق الأصلية تالفة

# بالرسالة صفحات
# لم ترد بالأصل

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

# Improving the Hygienic Quality of Soft Cheese Ripened in Brine (Domiati Cheese) Produced in Some Traditional Low Technology Dairy Plants

**Thesis presented by**

## Shimaa Salah Awaad Mohamed

(B.V.Sc., Cairo University, 2012; M.V.Sc., Cairo University, 2016)

**For the degree of Ph.D.**

**(Hygiene and Control of Milk and its products)**

**Under Supervision of**

## Prof. Dr. Said Sayed Sallam

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

## Prof. Dr. Ashraf Ahmed Moawad

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

## Dr. Ayah Badawi Abdel-Salam

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

**(2020)**

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

# Supervision sheet

**Prof. Dr. Said Sayed Sallam**

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

**Prof. Dr. Ashraf Ahmed Moawad**

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

**Dr. Ayah Badawi Abdel-Salam**

Assistant Professor of Milk Hygiene and Control
Faculty of Veterinary Medicine
Cairo University

**(2020)**

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

Cairo University

**Name:** Shimaa Salah Awaad Mohamed
**Date and place of birth:** 16/5/1990, Cairo
**Nationality:** Egyptian
**Degree:** Ph.D.
**Specialization:** Food Hygiene and Control (Milk and its Products)
**Supervision:**
**Prof. Dr. Said Sayed Sallam** Professor of Milk Hygiene and Control, Faculty of Veterinary Medicine, Cairo University
**Prof. Dr. Ashraf Ahmed Moawad** Professor of Milk Hygiene and Control, Faculty of Veterinary Medicine, Cairo University
**Dr. Ayah Badawi Abdel-Salam** Assistant Professor of Milk Hygiene and Control, Faculty of Veterinary Medicine, Cairo University

**Title of the thesis:** Improving the Hygienic Quality of Soft Cheese Ripened in Brine (Domiati Cheese) Produced in Some Traditional Low Technology Dairy Plants

**ABSTRACT**

To improve the hygienic quality of ripened Domiati cheese produced in some traditional low technology dairy plants our study was divided into two parts. The first part investigated the impact of raw materials and processing techniques on the microbiological quality of Egyptian Domiati cheese. In which, three hundred random composite samples were collected from three traditional factories at Fayoum Governorate, Egypt. Collected samples represented twenty-five each of: raw milk, table salt, calf rennet, microbial rennet, water, environmental air, whey, fresh cheese, ripened cheese & swabs from: worker's hands; cheese molds & utensils and tanks. All samples were examined microbiologically for Standard Plate Count (SPC), coliforms count, *Staphylococcus aureus* (*S. aureus*) count, total yeast & mould count, presence of *E. coli*, salmonellae and *Listeria monocytogenes* (*L. monocytogenes*). Regardless the quality of used raw materials and the processing techniques, ripening period seemed to have significant effect on improving the quality of the final product through the prevailed adverse conditions. The diverse of microorganisms and their counts in raw materials, food handlers and food contact surfaces, besides, the processing conditions have impact on the quality and safety of the product.

The second part studied the effect of some improved processing techniques on the microbiological and sensory quality of Domiati cheese. Different trials were made to overcome the common defects that usually occur, as well as to improve the microbiological quality of the produced cheese without affecting the final product organoleptic quality. Trials include use of raw-, pasteurized- and cultured pasteurized milk for cheese making, accompanied with or without sanitizing of equipment with 0.25% hydrogen peroxide, or adding 0.1% potassium sorbate as a preservative to milk. 3 trials were made for different treatments. Samples from fresh and ripened produced cheese from different treatments were examined microbiologically and organoleptically. Pasteurization of raw milk positively affected the microbiological quality, but negatively affected the organoleptic parameters of cheese. The use of cultured pasteurized milk improved both the microbiological and sensory parameters of ripened final product. Sanitizing of food contact surfaces with hydrogen peroxide improved the microbiological quality of the produced cheese. However, it negatively affects the overall acceptability of the organoleptic parameters. Addition of potassium sorbate 0.1% found to be effective in controlling the microbial growth with no effect on final product sensory parameters. Domiati cheese makers are recommended to use cultured pasteurized milk with addition of potassium sorbate, as they not only had a nearly similar sensory parameters to that arise from raw milk cheese but also more safer to the consumer. Recommendations were given to Domiati cheese manufacturers to save them from economic losses, as well as, to safeguard the consumer's health through production of high quality and safe products.

**Key words:** Domiati cheese, raw milk, pasteurized milk, cultured pasteurized milk, potassium sorbate and hydrogen peroxide, ripening period.

# *Dediction*

*To my mother's soul, I ask the greatest Allah to have mercy upon her and have her in paradise*

*To my lovely husband, Ahmed, for his patience, love and friendship*

*To my lovely daughter, princess Talia*

*To my great and kind father*

*To my sisters Nourhan and Mayada and to my brother Mohamed*

*And Also to my friends*

# *ACKNOWLEDGEMENT*

*First of all, I am very thankful to my God for helping me to complete this thesis.*

*No words can adequately express my science gratitude and great appreciation to my supervisor* ***Prof. Dr. Said Sayed Sallam****, Prof. of Milk Hygiene, Faculty of Veterinary Medicine, Cairo University who offered me a lot of his time and who devoted his experience to provide me with the best possible pieces of advice and suggestion to this work.*

*I wish to express the deep appreciation and sincerest gratitude to my supervisor* ***Prof. Dr. Ashraf Ahmed Moawad****, Prof. of Milk Hygiene, Faculty of Veterinary Medicine, Cairo University, for his stimulating supervision, valuable guidance, continuous help and kind advice during this work.*

*I am extremely thankful to my supervisor* ***Dr. Ayah Badawi Abdel-Salam****, Assistant Professor of Milk Hygiene, Faculty of Veterinary Medicine, Cairo University for her encouragement, enthusiasm, dynamism, valuable help and great patience during work.*

*It is difficult to find words to express the full extent of my thanks, gratefulness and appreciation to* ***Dr. Hesham Abdelrahman****, Lecturer of Veterinary Hygiene and Management, Faculty of Veterinary Medicine, Cairo University for his active participation and continuous support in statistical analysis for interpretation of the results.*

*Appreciation also goes to all members of Food Hygiene and Control Department, Faculty of Veterinary Medicine, Cairo University for their encouragement and help.*

# CONTENTS

# List of tables

# List of figures

# CHAPTER (1)

# INTRODUCTION

# INTRODUCTION

Cheese ripened under brine or white-brined cheese have been produced in border countries of the Mediterranean Sea and some Balkan countries. Brined cheese represent 5% of the total production of cheese in the world. These cheese have white color, salty, acidic, and sometimes a piquant taste with no rind, no gas holes, and a close texture **(Fuquay *et al.*, 2011 and McSweeney *et al.*, 2017)**.

White-brined cheese is traditionally consumed either fresh or after ripening in a brined solution (5–20% NaCl) at room temperature. Feta, Domiati, Halloumi, and Beyaz peynir are well-known varieties in this group of cheese **(Fox *et al.*, 2004 and Al-Holy *et al.*, 2012)**.

Domiati cheese is the most popular Egyptian cheese variety which accounts for ~75% of the total white soft cheese production. It can be consumed either fresh or after ripening (2-4 months). Ripening in brine can take place either at room temperature (Istamboli cheese) or at about 10 $^{o}$C (Baramili cheese) **(Fuquay *et al.*, 2011 and Alnemr *et al.*, 2016)**.

Domiati cheese has a very high nutritive value as they contain easily absorbed, decomposed proteins, fats (high concentration of short and medium chain fatty acids); lactose, calcium, phosphorus, minerals and some B group vitamins; which may facilitate multiplication and proliferation of microbial load in cheese, especially traditionally produced Domiati cheese made from raw milk **(Touch & Deeth, 2009 and Blažić *et al.*, 2017)**.

Traditionally, Domiati cheese is made from raw milk of either buffalo's or cow's milk or mixture of them, with the addition of (10 -15%) salt directly to cheese milk before renneting, after salting, liquid animal rennet is added to have the coagulum in 2.5 - 3 hours, the curd is scooped into wooden molds coated with cheesecloth; then pressed lightly before being cut into blocks. The filtrated salty whey is collected for pickling the