STUDIES ON MANUFACTURE OF DOMIATI CHEESE MADE BY DIRECT ACIDIFICATION

Ву

ABDALLA MOHAMED MOHAMED GAAFAR

B. Sc. (Agric.) Ain Shams University 1974

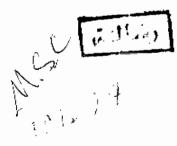
THESIS

Submitted in Partial Fulfilment of the Requirements for the Degree Of

MASTER OF SCIENCE

To

Food Science Department Faculty of Agriculture Ain Shams University



1979



APPROVAL SHEET

Title: STUDIES ON MANUFACTURE OF DOMIATI CHEESE MADE BY DIRECT ACIDIFICATION

Name: ABDALLA MOHAMED MOHAMED GAAFAR

This Thesis for the M.Sc. Degree had been approved by:

Dr. S.M. Khalafalla.

Dr.

Committee in Charge

Date: 16 / 8 /1979



This Thesis is Most Respectfully Dedicated to Honest and Sincere Men who Silently and Intellectually Devoted Themselves to the Welfare of My Country. One of Them is MOHAMED MOHAMED GAAFR MANSOUR, My Father, My Teacher, and My Best Friend.

ACKNOWLEDGEMENT

The author would like to express the deepest gratitude and sincere appreciations to Prof. A. A.

HOFI, Professor of Dairying and Head of the Food Science Department, Faculty of Agriculture, Ain-Shams University, and Prof. A. E. SHEHATA, Professor of Dairying; and A.A.

ASKER, Associate Professor of Dairy in the same Department, for their guidance, valuable suggestions, encouragement and every possible help, they kindly offered throughout the course of this work.

I am very much indebted to all the staff members of the Department for their helps and encouragement.

CONTENTS

		Page
INTRODUCTION	• • • •	1
REVIEW OF LITERATURE		3
1. Effect of direct acidification on milk		
properties.	• • • •	3
a. Rennet coagulation time		3
b. Curd tension		4
c. Syneresis	• • • •	7
d. Calcium distribution	• • • •	8
II. Effect of direct acidification on		
cheese properties.		9
EXPERIMENTAL PROCEDURES	• • • •	16
- Preparation of milk	• • • •	16
- Rennet coagulation time	• • • •	16
- Curd tension	• • • •	17
- Syneresis	• • • •	17
- Soluble and ionizable calcium contents		
of milk.	• • • •	17
- Cheese manufacture	• • • •	17
- Sampling of cheese		18
- Cheese analysis	• • • •	19
- Moisture content	• • • •	19
- Salt content	• • • •	19
- Titratable acidity and pH		19
- Fat content	• • • •	19
- The total volatile acidity	• • • •	19
- Rate of proteolysis	• • • •	20
- Quality of cheese	• • • •	20
- Statistical analysis		20

		Page
RESULTS AND DISCUSSION	• • • •	21
I. Effect of direct acidification on		
milk properties	• • • •	21
a) Rennet coagulation time	• • • •	21
b) Curd tension	• • • •	32
c) Syneresis	• • • •	42
d) Calcium distribution	• • • •	49
 Soluble calcium content 	• • • •	49
ii) Tonizable calcium content	• • • •	53
II. Effect of direct acidification on		
Domiati cheese properties.		66
- Moisture content	••••	66
- Cheese yield	• • • •	70
- Salt content	• • • •	82
- Titratable acidity	;	84
- pH	• • • •	89
- Fat content	• • • •	91
- The total volatile acidity	• • • •	93
- Proteolytic changes in cheese	• • • •	100
a) Soluble nitrogen contents of		
cheese	• • • •	100
b) Soluble tyrosine and tryptophan		
contents of cheese.		103
i) Soluble tyrosine content	* * * *	103
ii) Soluble tryptophan content	• • • •	109
- Quality of cheese		118
SUMMARY AND CONCLUSION		124
REFERENCES	• • • •	131
ARABIC SUMMARY	••••	

LIST OF TABLES

Table			Page
1	Effect of type of acid and pH of milk or rennet coagulation time of salted and unsalted milk.	••••	22
2	Analysis of variance for the effect of type of acid, pH and salting of milk on rennet coagulation time.	••••	29
3	Effect of pH of milk on rennet coagulation time of acidified milk.		30
4	Effect of the interaction between the type of acid used for acidification of unsalted milk and pH of milk on rennet coagulation time.	••••	30
5	Effect of the interaction between the type of acid used for acidification of salted milk and pH of milk on rennet coagulation time.	••••	31
6	Effect of type of acid and pH of milk or curd tension of salted and unsalted milk	1 5	33
7	Analysis of variance for the effect of type of acid, pH and salting of milk on the curd tension.	••••	38
8	Effect of pH of milk on curd tension of acidified milk.	••••	39
9	Effect of the interaction between the ty of acid used for acidification of unsalted milk and pH of milk on curd tension.	pe	39
10	Effect of the interaction between the ty of acid used for acidification of salted milk and pH of milk on curd tension.		40
11	Effect of type of acid and pH of milk on syneresis of salted and unsalted milk.	1	43

Table		Pag	e
12	Analysis of variance for the effect of type of acid, pH and salting of milk on the syneresis of the resultant curd	• 5	0
13	Effect of pH of milk on syneresis of the resultant curd.	. 5	1
14	Effect of the interaction between the type of acid used for acidification of unsalted milk and pH of milk on syneresis of the resultant curd.	• 5	1
15	Effect of the interaction between the type of acid used for acidification of salted milk and pH of milk on syneresis of the resultant curd.	• 58	2
16	Effect of type of acid and pH of milk on soluble calcium content of salted and unsalted milk.	• 5 ⁴	4
17	Analysis of variance for the effect of type of acid, pH and salting of milk on the soluble calcium content	• 5′	7
18	Effect of pH of milk on the soluble calcium content of acidified milk	. 5	8
19	Effect of type of acid and pH of milk on ionizable calcium content of salted and unsalted milk	• 55	9
20	Analysis of variance for the effect of type of acid, pH and salting of milk on the ionizable calcium content	e . 62	2
21	Effect of pH of milk on the ionizable calcium content of scidified milk	6٠	3

Table		Page
22	Effect of the interaction between the type of acid used for acidification of unsalted milk and pH of milk on its ionizable calcium content.	. 63
23	Effect of the interaction between the type of acid used for acidification of salted milk and pH of milk on its ionizable calcium content	. 64
24	Effect of type of acid and pH of milk at coagulation on the moisture content of Domiatic cheese during pickling	. 67
25	Analysis of variance for the effect of type of acid and pH of milk at coagulation on the moisture content of Domiati cheese.	. 71
26	Effect of pH of milk at coagulation on the moisture content of Domiati cheese made by direct acidification procedure	. 72
27	Effect of the interaction between the type of acid used for acidification of milk and pH of milk at coagulation on the moisture content of Domiati cheese	. 72
28	Effect of type of acid and pH of milk at coagulation on the yield of Domiati cheese during pickling	• 74
29	Analysis of variance for the effect of type of acid and pH of milk at coagulation on the yield of Domiati cheese	. 75
30	Effect of pH of milk at coagulation on the yield of Domiati cheese made by direct acidification procedure.	. 78

Table		Page
31	Effect of the interaction between the type of acid used for acidification of milk and pH of milk at coagulation on the yield of Domiati cheese.	78
32	Effect of type of acid and pH of milk at coagulation on the weight loss of Domiati cheese during pickling	7 9
33	Effect of type of acid and pH of milk at coagulation on the salt content of Domiati cheese during pickling	83
34	Effect of type of acid and pH of milk at coagulation on the acidity of Domiati cheese during pickling	8 5
35	Analysis of variance for the effect of type of acid and pH of milk at coagulation on the acidity of Domiati cheese	86
36	Effect of pH of milk at coagulation on the acidity of Domiati cheese made by direct acidification procedure	87
37	Effect of the interaction between the type of acid used for acidification of milk and pH of milk at coagulation on the acidity of Domiati cheese.	87
38	Effect of type of acid and pH of milk at coagulation on pH of Domiati cheese during pickling.	90
39	Effect of type of acid and pH of milk at coagulation on fat in dry matter (FDM) of Domiati cheese during pickling	92
40	Effect of type of acid and pH of milk at coagulation on the total volatile acidity of Domiati cheese during pickling	94

Table		<u>P</u>	age
41	Analysis of variance for the effect of type of acid and pH of milk at coagulation on the total volatile acidity of Domiati cheese.	••••	98
42	Effect of pH of milk at coagulation on the total volatile acidity of Domiati cheese made by direct acidification procedure.	••••	99
43	Effect of the interaction between the type of acid used for acidification of milk and pH of milk at coagulation on the total volatile acidity of Domiati cheese.	••••	9 9
44	Effect of type of acid and pH of milk at coagulation on the proteolysis of Domiati cheese during pickling.	••••	1 01
45	Analysis of variance for the effect of type of acid and pH of milk at coagulat on SM/TM content of Domiati cheese.	ion	104
46	Effect of pH of milk at coagulation on the proteolysis of Domiati cheese made by direct acidification procedure.	••••	105
47	Effect of the interaction between the type of acid used for acidification of milk and pH of milk at coagulation on the proteolysis of Domiati cheese.	••••	105
48	Effect of type of acid and pH of milk a coagulation on the soluble tyrosine content of Domiati cheese during pickling.		107
49	Analysis of variance for the effect of type of acid and pH of milk at coagulat on the soluble tyrosine content of Domi cheese.		130

Table		Page
5 0	Effect of pli of milk at coagulation on the soluble tyrosine content of Domiati cheese made by direct acidification procedure.	111
51	Effect of the interaction between the type of acid used for acidification of milk and pH of milk at coagulation on the soluble tyrosine content of Domiati cheese.	111
52	Effect of type of acid and pH of milk at coagulation on the soluble tryptophan content of Domiati cheese during pickling.	112
53	Analysis of variance for the effect of type of acid and pH of milk at coagulation on the soluble tryptophan sontent of Domiati cheese.	115
54	Effect of pH of milk at coagulation on the soluble tryptophan content of Domiati cheese made by direct acidification procedure.	1 16
55	Effect of the interaction between the type of acid used for acidification of milk and pH of milk at coagulation on the soluble tryptophan content of Domiati cheese.	11 6
56	Effect of type of acid on the quality of Domiati cheese made by direct acidification at pH 6.2	119
57	Effect of type of acid on the quality of Domiati cheese made by direct acidification at pH 6.0.	120

[able			Page
58	Effect of type of acid on of Domiati cheese made by acidification at pH 5.9		121
59	Effect of type of acid on of Domiati cheese made by acidification at pH 5.7.	the quality direct	<u>1</u> 22

000000000

LIST OF FIGURES

<u>Figure</u>		Page
1	Effect of type of acid and pH of milk on rennet coagulation time of unsalted buffaloe's milk.	23
2	Effect of type of acid and pH of milk on rennet coagulation time of salted buffaloe's milk.	26
3	Effect of type of acid and pH of milk on curd tension of salted and unsalted buffaloe's milk.	34
4	The relationship between rennet coagu- lation time and the curd tension of un- salted acidified milk	41
5	Effect of type of acid and pH of milk on syneresis of salted and unsalted buffaloe's milk.	. 44
6	The relationship between curd tension and syneresis of unsalted acidified milk.	47
7	The relationship between curd tension and syneresis of salted acidified milk	48
8	Effect of type of acid and pH of milk on soluble calcium of salted and unsalted buffaloe's milk.	55
9	Effect of type of acid and pH of milk on ionizable calcium of salted and unsalted buffaloe's milk.	. 60
10	Effect of type of acid and pH of milk at coagulation on the moisture content of Domiati cheese during pickling	. 68