THE USE OF SOME EDIBLE ADDITIVES IN THE PRODCTION OF FUNCTIONAL CHEESE TYPES

By

ROWIDA SHAZLY ABDELKADER MOHAMED

B.Sc.Agric. Sc. (Dairy Sci. & Tech.), Fac. of Agric., Cairo Univ., 1993

M.Sc.Agric. Sc. (Dairy Sci. & Tech.), Fac. of Agric., Cairo Univ., 2001

A Thesis Submitted in Partial Fulfillment
Of
the Requirements for the Degree of

DOCTOR OF PHILOSOPHY
in
Agricultural Sciences
(Dairy Science and Technology)

Department of Food Sciences
Faculty of Agriculture
Ain Shams University

2020

Approval Sheet

THE USE OF SOME EDIBLE ADDITIVES IN THE PRODCTION OF FUNCTIONAL CHEESE TYPES

By

ROWIDA SHAZLY ABDELKADER MOHAMED

B.Sc.Agric. Sc. (Dairy Sci. & Tech.), Fac. of Agric., Cairo Univ., 1993
M.Sc.Agric. Sc. (Dairy Sci. & Tech.), Fac. of Agric., Cairo Univ., 2001

This thesis for the Ph.D. degree has been approved by:

Dr. Samia Mahmoud El- Deib .....
Professor of Dairy Science and Technology, Faculty of Agriculture, Cairo University

Dr. Youssef Morsy Youssef El-Kenany .....
Professor Emeritus of Dairy Science and Technology, Faculty of Agriculture, Ain Shams University

Dr. Zakri Mohamed Rezk Hassen .....
Professor Emeritus of Dairy Science and Technology, Faculty of Agriculture, Ain Shams University

Dr. Rezk Azab Awad .....
Professor of Dairy Science and Technology, Faculty of Agriculture, Ain Shams University

Date of examination: / / 2020

THE USE OF SOME EDIBLE ADDITIVES IN THE PRODCTION OF FUNCTIONAL CHEESE TYPES

By

ROWIDA SHAZLY ABDELKADER MOHAMED

B.Sc.Agric. Sc. (Dairy Sci. & Tech.), Fac. of Agric., Cairo Univ., 1993

M.Sc.Agric. Sc. (Dairy Sci. & Tech.), Fac. of Agric., Cairo Univ., 2001

Under the supervision of:

Dr. Rezk Azab Awad

Professor of Dairy Science and Technology, Food Science Department, Faculty of Agriculture, Ain Shams University (Principal supervisor)

Dr. Zakria Mohamed Rezk Hassen

Professor Emeritus of Dairy Science and Technology, Food Science Department, Faculty of Agriculture, Ain Shams University

Dr. Wafaa Mahmoud Salama

Head Researches of Dairy Science and Technology, Dairy Science Research Department, Agricultural Research Center, Giza, Egypt

ABSTRACT

Rowida S. Abdelkader: The use of some of Edible Additives in the Production of Functional Cheese Types. Unpublished Doctor of Philosophy Thesis, Department of Food Science, Faculty of Agriculture, Ain Shams University, 2020.

The goal of this study was to produce a functional cheeses with good sensory properties using different edible additives and its effects on the characteristics of cheese quality. The study was conducted in three parts, the first part to produce low-fat soft cheese with adding sodium caseinate (SC) and butter milk powder (BMB) in different ratios to the cheese milk. All cheese treatments stored in salted whey (5% NaCl) at 5±2°C up to 3 months. The resultant cheeses were evaluated for chemical composition, physical, rheological and sensory properties when fresh and after 1,2,3 months of storage. The results indicated that, addition of sodium caseinate and butter milk powder to cheese milk led to a significant increase in moisture content of resultant cheese compared to control II (low fat cheese). A gradual decrease in moisture content of all treatments was observed as the storage period advanced. Moreover, the results showed that, replacing of milk fat with SC + BMP caused a significant decrease in hardness, adhesiveness, springiness, chewiness and gumminess in fresh cheese compared to control II. Low-fat soft cheese treatments were characterized by higher ratio of SN % than control II. Sensory properties of low-fat soft cheese were highly improved by adding SC + BMP to cheese milk as a fat replacer**.** the most preferable low-fat soft cheese was produced with adding SC + BMP, 1+1(T3).

The second part was planed to manufacture processed cheese spreads with adding onion (fresh, fried and powder) as a flavor. The resultant cheese spreads were evaluated for chemical composition, physical, rheological and sensory properties when fresh and after, 1,2,3 months of storage at 5±2°C . The results revealed that, increasing the ratio added of onion either fresh or fried resulted in higher moisture content. Processed cheese with 2% fresh onion had the lowest fat content while

the highest fat content was recorded for treatments flavored with 2% OF onion powder or fried. The lowest TN content was in treatment with 1% onion powder and the highest was recorded in treatment with 1% fresh onion. During storage period, the SN content increased in all processed cheese samples. There was a slight significant difference in acidity values of different onion processed cheese treatments. Processed cheese with 2% onion powder had the lowest ash content. Processed cheese treatments with added onion exhibited significantly higher meltability than control sample. Treatments of onion powder showed lower oil separation than that with fresh or fried onion. All processed cheese treatments with adding onion were acceptable being highest acceptability in treatments with fried onion.

In the third part, production of processed cheese spreads with different ratio (1,2%) of garlic (fresh, fried or powder) as a flavor was studied. All treatments with garlic either fresh, fried or powder had lower moisture values than control. There was a slight increase in fat and protein content during storage period. The lowest TN content was in treatment with 1% powder garlic and the highest was recorded in treatment with 1% fresh garlic. The results indicated that T2 (2% fresh garlic) has the lowest SN while T4 (2% fried garlic) has the highest among all treatments including control. The data also indicated that there was a slight difference in acidity values of different garlic processed cheese treatments. All treatments with garlic showed slightly higher salt content compared with control. The meltability was also increased significantly with adding garlic in cheese base formula compared to processed control. It's clear from the results that, processed control presented a lower oil separation value compared to garlic processed cheese treatments. All cheeses were sensory acceptable but the best processed cheese flavored with 2% fried garlic.

Key words: Low fat cheese, Butter milk powder**,** Sodium caseinate Onion, Garlic, Processed cheese, Functional cheese

ACKNOWLEDGEMENT

I gratefully wishes to express my deepest gratitude and infinites thanks to major **Prof. Dr. Rezk Azab Awad,** Prof. of Dairy Science and Technology, Fac. of Agric., Ain Shams University for suggesting the problems, supervising and guiding, the work as well as for his continuous assistance throughout the investigation. I learnt several things from him which I never have had the opportunity to learn. I cannot use may words to express may deep respect to him.

A special pleasure is extending to **Prof. Dr. Zakaria Mohamed Rezk Hassan**, Prof. of Dairy Science and Technology, Fac. of Agric., Ain Shams University, for his professional, emotional assistance and for the true help offered when I needed him.

I would like also to express my gratitude and appreciation to **Prof. Dr. Wafaa Mahmoud Salama,** Head of Research Dairy Science Department, Agric. Res. Center for her continuous supervision and the true help offered throughout the lab work and the writing of the manuscript.

I sincerely thank and appreciate **Prof. Dr. Yehia. A. Heikal** Prof.of Food Science and Technology, Food Science Dept., Faculty of Agriculture, Ain Shams University for his kindness and generous advice during my work in this research**.**

Last, and by no means least, my heartfelt thanks to my colleagues and all staff in Food Science Department, Faculty of Agriculture, Ain Shams University.

CONTENTS

LIST OF TABLES