

بسم الله الرحمن الرحيم





شبكة المعلومات الجامعية التوثيق الالكتروني والميكروفيلم



جامعة عين شمس

التوثيق الإلكتروني والميكروفيلم

قسم

نقسم بالله 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





بالرسالة صفحات
لم ترد بالأصل





بعض الوثائق الأصلية تالفة



B110771

**SOME ASPECTS OF MANUFACTURING AND SOME
PROPERTIES OF LOW CALORIE ZABADY**

BY

SUSU MOUSAD AHMED EL-ASFORY

*B.Sc. Agric. (Dairying) Fac. of Agric., Tanta Univ.,
Kafr El-Sheikh, 1995*

THESIS

Submitted in Partial Fulfillment of the
Requirements for the Degree of
MASTR OF SCIENCE
Agriculture (Dairying)

To

**Dairy Department
Faculty of Agriculture
Tanta University
Kafr El-Sheikh
1999**

APPROVAL SHEET

**SOME ASPECTS OF MANUFACTURING AND SOME
PROPERTIES OF LOW CALORIE ZABADY**

BY

SUSU MOUSAD AHMED EL-ASFORY

This thesis for the M.Sc. degree
has been approved by:

Prof. Dr. *L. Hamza*
Prof. Dr. *N. Mehanna*
Prof. Dr. *A. Mehanna*
Prof. Dr. *H. S. S. A. N. H.*

Committee in charge

Date: / / 1999.

**SOME ASPECTS OF MANUFACTURING AND SOME
PROPERTIES OF LOW CALORIE ZABADY**

BY

SUSU MOUSAD AHMED EL-ASFORY

*B.Sc. Agric. (Dairying) Fac. of Agric., Tanta Univ.,
Kafr El-Sheikh, 1995*

THESIS

Submitted in Partial Fulfillment of the
Requirements for the Degree of
MASTR OF SCIENCE
Agriculture (Dairying)

Under the supervision of:

Prof. Dr. N. M. Mehanna

Prof. of Dairying,
Fac. of Agric.; Kafr El-Sheikh

Prof. Dr. A. S. Mehanna

Prof. of Dairying,
Fac. of Agric.; Kafr El-Sheikh

Dr. Th. M. Saleh

Ass. Prof. of Dairying,
Fac. of Agric.; Kafr El-Sheikh

1999

Acknowledgement

The investigator would like to express her appreciation and gratitude to the supervising committee:

Prof. Dr. N. M. Mehanna

Prof. Dr. A. S. Mehanna

Dr. Th. M. Saleh

*Fac. of Agric., Tanta Univ., Kafr El-Sheikh
For their help and continuos encouragement
throughout the course of the present study.*

*Deep thanks are extended to all staff members
and colleagues of the dairy department, Fac. of
Agric., Tanta Univ., Kafr El-Sheikh.*

CONTENTS

	Page
INTRODUCTION -----	1
REVIEW OF LITERATURE -----	4
1: Low- calorie yoghurt-----	4
A: Occurrence of low-calorie zabady in the local market-----	4
B: Occurrence and standards of low calorie yoghurt in countries other than Egypt-----	5
C: Manufacture, composition and properties of low-calorie yoghurt-----	8
2: Fortification of milk and yoghurt with iron-----	15
A: The use of different sources of iron-----	15
B: Impact of fortification with iron-----	17
MATERIALS AND METHODS -----	21
Materials-----	21
Manufacture of zabady-----	21
The chemical methods of analysis-----	22
The rheological analysis-----	27
Determination of zabady starter activity-----	27
Calculation of the energy value-----	28
The organoleptic evaluation-----	28
The statistical analysis-----	28
PART I -----	29
Manufacture, composition and some properties of zabady made from fresh buffalo's milk of different chemical composition -----	29
Experimental -----	29
Results and discussion -----	30
Dilution of zabady milk with water -----	30
Dilution of zabady milk with whey -----	48
Dilution of zabady milk with UF milk permeate -----	65
General discussion -----	80
Summary and conclusion -----	85
PART II -----	88
Manufacture, composition and some properties of zabady made from full-fat, low-fat and non-fat buffalo's milk -----	88
Experimental -----	88
Results and discussion -----	89
Effect of fat content in zabady milk on the changes in pH values during zabady making -----	89
Chemical composition and some properties of the resultant Zabady---	91
Acidity and pH -----	91
Lactose content -----	92

Acetaldehyde content -----	92
Protein content -----	95
Soluble nitrogen (SN) content -----	97
Fat content -----	97
Total volatile fatty acids (TVFA) content -----	99
Ash content -----	99
Calorific value -----	100
Rheological properties of the resultant zabady -----	102
Curd tension -----	102
Curd syneresis -----	102
The organoleptic properties -----	104
General discussion -----	108
Summary and conclusion -----	111
PART III -----	113
Manufacture and some properties of zabady made from buffalo's milk fortified with iron -----	113
Experimental -----	113
Results and discussion -----	114
Sensory evaluation of fresh and stored non fat zabady (NFZ) as affected by fortification with iron -----	114
A. Effect of using FeAS -----	114
B. Effect of using FeC -----	117
C. Effect of using FeS -----	120
Sensory evaluation of fresh and stored low-fat zabady (LFZ) as affected by fortification with iron -----	123
A. Effect of using FeAS -----	123
B. Effect of using FeC -----	126
C. Effect of using FeS -----	129
Sensory evaluation of fresh and stored full-fat zabady (FFZ) as affected by fortification with iron -----	133
A. Effect of using FeAS -----	133
B. Effect of using FeC -----	136
C. Effect of using FeS -----	139
Activity of zabady culture in non-fat zabady milk as affected by fortification with iron -----	144
A. Effect of using FeAs -----	144
B. Effect of using FeC -----	144
C. Effect of using FeS -----	147
Activity of zabady culture in low-fat zabady milk as affected by fortification with iron -----	149
A. Effect of using FeAs -----	149
B. Effect of using FeC -----	149
C. Effect of using FeS -----	152
Activity of zabady culture in full-fat zabady milk as affected by	

fortification with iron	152
A. Effect of using FeAs	152
B. Effect of using FeC	155
C. Effect of using FeS	155
Activity of zabady starter as affected by using different sources for iron in the fortification treatments	158
Some properties of fresh and stored full-fat zabady as affected by fortification with iron	160
A. Effect of using FeAs	160
Acidity and pH	160
Fat content	160
Total volatile fatty acids (TVFA) content	162
Thiobarbituric acid (TBA) test	162
Acetaldehyde content	162
Curd tension values	163
Curd syneresis	163
B. Effect of using FeC	163
Acidity and pH	163
Fat content	166
TVFA content	166
TBA values	166
Acetaldehyde content	166
Curd tension values	167
Curd syneresis	167
C. Effect of using FeS	167
Acidity and pH	167
Fat content	170
TVFA content	170
TBA values	170
Acetaldehyde content	170
Curd tension values	171
Curd syneresis	171
General discussion	176
Summary and conclusion	180
REFERENCES	184
ARABIC SUMMARY	196

INTRODUCTION

INTRODUCTION

The process of yoghurt making dates back thousands of years and the acidification of milk by fermentation with yoghurt culture is one of the ancient crafts which was used to preserve milk. However, the popularity of yoghurt has spread from the Balkans and the Middle East to other parts of the world (Tamime et al. 1984) and since 1960s, the per capita consumption of yoghurt has increased significantly in most countries (IDF, 1982, 1992).

It may be of interest to point out that the word "yoghurt" is derived from the Turkish word "jugurt" and in 1980 Tamime and Deeth reported the variety of names by which this product is known in different countries. This includes the traditional name of "zabady" in Egypt and Sudan. However, in recent years consumers are more health conscious than ever before. In North America and Europe as well as some developing countries like Egypt, they have been modifying their eating habits for many health reasons and the guide lines call for avoiding too much fat and cholesterol as part of planning a healthful diet. This has largely involved also reducing the amounts of sugar, salt, cholesterol and certain additives in the diet. Food technologists and the manufactures have responded to such demands and over the past few years, there have been rapid marked growth in perceived healthy foods and drinks including dairy products (Tamime et al. 1994). Such products are marketed under different names such as low-fat, light, sugar-free and/or low calorie. These innovative product developments can be achieved by using one or combinations of the following methods:

(a) replacement of the carbohydrate with intense sweeteners, (b) reducing the carbohydrate content using fibers or bulking ingredients (i.e. hydrocolloids such as carrageenan or guar gum), (c) lowering the fat content in traditional

products and (d) using fat-substitutes to replace fat in food whilst keeping the same functional and organoleptic properties as fats without the calories. The majority of the yoghurts produced in Europe and North America are low-fat products ($\leq 1.5\%$ fat). For example, in the UK, the economic retail value of yoghurt, skimmed milk and Cottage cheese has increased significantly from £ 565 m in 1985 to £ 1335 m in 1990 reflecting a growth of 2.4 fold (Tamime et al. 1994). In the USA, the light dairy products market was estimated at \$ 23.7 billion in 1991 and cultured dairy products including yoghurt amounted to 7.5% of the total sales (Anon, 1992). In this respect, the low-fat and non-fat yoghurt together captured 80% of the entire yoghurt market share in 1989 (Thompson, 1990).

On the other hand, it is well known that milk and dairy products are appreciated sources of proteins, calcium, vitamins and other nutrients (Rosenthal et al. 1993) but are frequently deficient in iron (Jarrett, 1979). However, the daily dietary requirement of iron is 5-10 mg for adults, 4-10 mg for children and 1.5 mg/kg body weight for infants (Underwood, 1971). Menstruating and pregnant women have considerably higher requirements. Iron supplements of 30-60 mg/day are usually recommended during pregnancy and lactation (Flynn and Power, 1985).

Generally, fortification of yoghurt with iron would help meet this nutritional need. An advantage of using yoghurt and other dairy products as the vehicle for supplementing with iron is the wide consumption of such products in different countries allover the world.

Iron as a component of haem in hameoglobin, cytochromes and other proteins plays an essential role in the transport, storage and utilization of oxygen. It is also a cofactor for a number of enzymes. Dificiency of iron is relatively common in both western and undeveloped countries. Such inadequate