BACTERIOLOGICAL AND CHEMICAL STUDIES ON MARKET ZABADY

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Thesis

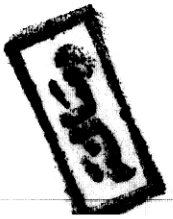
Submitted to Faculty of Agriculture
Ein Shams University

In Partial Fulfilment of the
Requirement for the Degree of

Master of Science
(Dairy)

National Research Centre

1969



To my Father and my Mother
For their Love and the Inspiration
they gave me.

ACKNOWLEDGMENT

The author gratefully acknowledges Prof. Dr. G.M. El-Sadek, Professor of Dairying and Head of the Food Science Department, College of Agric., Ein Shams University, and Dr. Khayria M. Naguib, Assistant Prof. of Dairy Microbiology, National Research Centre, under whom direction this research was conceived and conducted, for the many helpful discussions and suggestion, and the every possible help and guidance they kindly offered throughout the whole investigation.

The writer also wishes to extend her deepest thanks to the Dairy Research laboratory, National Research Centre for the facilities offered to make this work possible.

APPROVAL SHEET

This Thesis for the Degree of Master of Science has been approved by :

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(Committee in charge)

Date : / / 1969.

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INTRODUCTION AND OBJECTS OF RESEARCH

Zabady is a popular and widely consumed fermented milk in Egypt. It is one of the oldest known fermented milks. Since early times it has been an important article of food for peoples in the Middle East, especially in those countries bording the eastern Mediterranean coast. It is similar to some fermented milks such as "Lebeny" in Syria, "Dadhi" in India, and "Mazum" in Armenia. It is also similar to Yoghurt which is a quick-curdled, decidedly acid preparation with little or no alcohol.

Commercial production of fermented milk increased rapidly in Europe early in the 20th century after Metchnikoff's publication advocating consumption of sour milk to prolong life. Attempts to popularize yoghurt in the United States and Canada were first successful in the 1940's. This milk preparations are used largely because of their claimed therapeutic and health-promoting properties, due to the fact that the lactic acid bacteria in fermented milk are helpful in overcoming intestinal disturbances putrifaction.

The following is a brief description of the methods followed in its preparation in small shops and factories.

[illegible] then left to cool for few hours. The cream layer is skimmed off and used as scalded cream while milk is dispensed in the containers. The starter - being a small amount of previous zabady and diluted with milk or water - is added at the rate of a teaspoonful to each container which may be either glass, waxed paper, porcelain or even packed clay. The containers are placed in a wooden box warmed up by means of cool fire until the zabady is ripe, then it is distributed to the consumers.

In factories the method of making zabady could be summarised as follows :
The milk is heated to 190°F for 20 minutes and then left to cool to about 110°F. This process destroys the pathogenic organisms. It also concentrates the milk and increases the T.S. The milk is then inoculated with a culture taken from a previous zabady. The inoculated milk is then transferred to containers which may be either waxed paper or plastic. The containers are then incubated in a suitable place until the milk coagulates, then removed to a cool place.

Methods of commercial preparation of yoghurt vary considerably in certain details, but the basis process is

Technically, this term in all dairy plants. Good quality milk is heated both to reduce its microbial content and to improve it generally for growth of the yoghurt organisms. The heat treatment usually falls within the range 82°C (179.6°F) for 30 minutes to 93°C (199.4°F) for 60 to 90 minutes, then milk is cooled to about 48°C (118.4°F) and inoculated with 2 to 3 % of yoghurt culture. The inoculum is mixed well with the milk and then dispensed in the containers which are usually jars or cartons. These are incubated at 45°C (113°F) for 2.5-3.5 hr. until milk coagulates. The yoghurt is cooled to about 5°C (41°F) and held at this temperature until distributed to the consumers.

Until now there is not much information regarding the bacteriological and compositional properties of zabady. The object of the present investigation is to provide a clear picture of the chemical composition and the microbial population and the flavour components present in the zabady in Egypt.

The properties dealt with in this study were :

1) Organoleptic properties i.e. flavour, texture and body of zabady.

2) Acidity and [illegible] titratable acidity and pH values as well as the determination of the various chemical constituents of the zabady namely moisture, fat, total and soluble nitrogen, lactose and ash.

3) Determination of the flavour components i.e. acetaldehyde and diacetyl.

4) Microbial count of different groups and their identification as fair as possible.

5) Coliform's content as measured by presumptive coliform test M.P.N.

REVIEW OF LITERATURE

Review of Literature

The following is a brief review of the work carried on the bacteriology of the foreign yoghurt and local zabady.

Hasting & Hammer (1910) reported that the main types of bacteria responsible for yoghurt fermentation were L. bulgaricus and B. casei.

Doshi (1949) found a new species of Torula in dahi which was described and named T. dahi. This yeast was found to produce sufficient riboflavin, nicotenic acid, biotin, aneurin, pyridoxin, p-amino benzoic acid and folic acid to support lactic acid bacteria.

Pette & Lolkema (1950) studied symbiosis and antibiosis in mixed cultures of L. bulgaricus and S. thermophilus. They found that typical yoghurt is a mixed culture in milk of Lactobacillus bulgaricus and Str. thermophilus and considered the presence of other organisms not essential. They added that the rate of acid development and increase in numbers of the streptococci being greater in the mixed than in the pure cultures, but the numbers of lactobacilli were partically the same in the former as in the latter culture. They concluded that the stimulatory action of the lactobacilli was exerted while the streptococci

[illegible] in the logarithmic phase and that in the latter stage they were inhibitory to the streptococci because of the large amounts of lactic acid they produced.

Pette & Lolkema (1950) also studied the growth stimulating factors for Str. thermophilus in yoghurt. They found that, the stimulatory effect of Lactobacillus bulgaricus seemed to depend on the liberation of water soluble heat-stable growth substances which the streptococci are themselves unable to liberate. These were shown to be amino acids, of which valine was the most important, set free by hydrolysis of the casein. They added that the stimulus was, however, strictly limited, and that too large quantities of amino acids were inhibitory to the streptococci.

Pette & Lolkema (1951) studied the factors influencing the proportion of streptococci to lactobacilli in a yoghurt culture, and found that the correct balance between rods and cocci 1 : 1 was essential if the high quality of a yoghurt culture is to be maintained. They also found that with the high acidity of the culture, high temperature of incubation and a high percentage of inoculation, the rods were favoured against the cocci

[illegible] would [illegible] daily transfers under such conditions, the cocci would soon die out and when the previous mentioned factors were taken low, the reverse would occur and the rods would disappear from the cultures.

Joseph (1951) reported that two bacterial species, Str. thermophilus and L. bulgaricus were involved in the production of yoghurt. He attributed the rapid acid production in the mixed culture of these two organisms to be caused by stimulation of the former by the latter which elaborates certain amino acids not present in sufficient quantities in the milk.

Davis, J.G.(1952) reported that all yoghurt to be the same in containing one strong lactic acid producing rod, different types of lactic streptococci, and sometimes a yeast. He stated that, cultures obtained from laboratories for preparing yoghurt vary slightly in their composition, but the most popular one appears to be an equal mixture of L. bulgaricus and S. thermophilus. The latter prepares the way for growth of the lactobacillus in the milk and also contributes to the flavour. He added that the bacterial flora of yoghurt varies according to the region of origin. Yeasts and oidium may always be