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Cairo University
Faculty of Veterinary Medicine
Food Hygiene Department

MICROBIOLOGICAL AND COMPOSITIONAL STATUS OF EGYPTIAN WHITE SOFT CHEESES

THESIS

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Cheese is the generic name for a group of fermented milk-based food products, produced in a wide range of flavours and forms throughout the world. Although the primary objective of cheese-making is to conserve the principal constituents of milk, cheese has evolved to become a food of ***haute cuisine*** with epicurean qualities, as well as being highly nutritious. ***Sandine*** and ***Elliker*** (1970) suggested that there are more than 1000 varieties of cheese. ***Walter*** and ***Hargrove*** (1972) described more than 400 varieties and listed the names of a further 400. The most common criterion for the classification is texture (very hard, hard, semi-soft, soft), which is related mainly to the moisture content of the cheese.

Most cheese authorities and historians consider that cheese was first made in the Middle East during Biblical times; Damietta cheese is the most popular type of pickled white soft cheese in Egypt. It is consumed either fresh or after pickling for few months.

The organoleptic characterization, chemical composition and the microbial quality and safety of Domiati cheese are the major area of concern for producers and consumers.

The organoleptic characterization of white soft cheese includes packaging, flavour "taste and odour", body texture, appearance and color consider the most important factors for evaluation. Their sum are very helpful in emerge the possible defects that may be found in the product. In addition most people accept and consume cheese principally for its organoleptic qualities and of course, due to its high valuable source of nutrients, especially protein, calcium and phosphorus.

The organoleptic characterizations of cheese are affected by complex factors, which include microbiological, enzymatic and physico-chemical processes (***Fox*** and ***Law***, 1991).

While many dairy products, if properly manufactured and stored, are biologically, biochemically, chemically and physically very stable, cheeses are, in contrast, biologically and biochemically dynamic, and, consequently, are inherently unstable (***Harbutt***, 2002).

Throughout manufacture and ripening, cheese production represents a finely orchestrated series of consecutive and concomitant biochemical events which, if synchronized and balanced, lead to products with highly desirable aromas and flavours but when unbalanced, result in off-flavours and odours.

Also a major cause of differences in the characteristics of cheese is the inter-species differences in the composition and physico-chemical characteristics of the milk used, which are reflected in the characteristics of the cheeses produced from them. (***Fox***, 1993)

Even when milk is properly pasteurized, the resulting cheese develops a less intense flavour and ripens more slowly than raw milk cheese, some members of the adventitious microflora are undesirable and produce off-flavours and odours in cheese and others undesirable changes. (***Sandine*** and ***Elliker***, 1970)

Pasteurization of cheese-milk minimizes the risk of cheese serving as a vector for food-poisoning or pathogenic microorganisms, so that even high-quality raw milk may be unacceptable for cheese manufacture (***Beuvier***, et al, 1997).

The composition of most cheeses falls within certain compositional ranges, sometimes with legal status. The most important compositional factors are fat-in-dry matter (FDM), moisture content, salt percentage and pH, as all aspects of cheese curd production (rennet coagulation, gel firmness, syneresis) are affected by the chemical composition of the cheese-milk, especially the concentrations of casein, calcium and pH. (***Fox*** and ***McSweeney*** 2003).

In a few special cases, e.g., Domiati, a high level of NaCl (10–12%) is added to the cheese-milk, traditionally to control the growth of the indigenous microflora. This concentration of NaCl has a major influence, not only on acid development, but also on rennet coagulation, gel strength and syneresis

As will as cheese-milk must be free from antibiotics, which totally, or partially, inhibit the starter bacteria; delayed acidification results in an abnormal composition and microflora and consequently in flavour and textural defects and perhaps very significantly in the growth of harmful, pathogenic or food-poisoning microorganisms (***Jenkins***, 1996).

The microbial quality and safety of Domiati cheese is the major area of concern for producers and consumers. It depends on the types of microorganisms introduced from raw milk, efficiency of processing and the hygienic practice applied in dairy plant. Handling of milk during cheese manufacture plays an important role in the proliferation of microbial flora and consequently impairs its utility and renders the product unfit for human consumption (***Sveum et al.***, 1992; ***Yousef et al.***, 2000; ***Leuschner*** and ***Boughtflower***, 2002).

Milk and dairy products are rich source of nutrients for consumers as well as for the bacteria, which contaminate the original milk or the products from different sources, some, species of which utilize milk sugar, lactose, as a source of energy, producing lactic acid, therefore heat-treatment of milk used for cheese manufacture is essential, as induced several changes in milk, e.g., killing of indigenous microorganisms, inactivation of indigenous milk enzymes and partial denaturation of whey proteins and their interaction (***Rance***, 1982)

In short words, manufacture of high quality Cheese commences with the selection of milk of high physical, chemical and microbiological quality.

Therefore the present work was planned to evaluate the market soft cheese in Cairo and Giza markets for the following items:

1-The organoleptic properties of cheese, depending on appearance & color, body and texture and flavour "taste and odour".

2-The chemical composition of cheese including fat-in-dry matter (FDM), fat content, moisture content, salt percentage and titratable acidity%.

3-The bacteriological quality of cheese including the following: -

a-Determination of total aerobic mesophilic bacterial count.
b-Determination of total Yeast and Mould counts
c-Enterobacteriaceae count
d-Rate of contamination with Coliforms (MPN/g.)
e-Total Staphylococci count and Staphylococcus aureus
f-Isolation and identification of Salmonellae

REVIEW OF LITERATURES

LITERATURE

Organoleptic examination

El-Safty and Ismail (1980) tested soft cheese which was made using (i) dried milk reconstituted with water (fat/ SNF ratio 6:12, control) and (ii) dried milk reconstituted with salted whey (fat/ SNF ratio 6:13), and pickled in the resultant whey at room temperature for 3 months. The authors concluded that the total organoleptic scores of the 2 types of cheese were similar in the fresh cheese, but typical Domiati flavour developed earlier in (ii) cheese compared with (i) cheese.

Saleem and Abdel-Mottaleb (1980) examined soft cheese which was prepared from ewes' milk enriched with cows' dried skim milk. The fresh cheese was smooth and firm with a sweet, slightly salty taste, but by day 7 had acquired a normal acid taste. The authors found that the organoleptic quality improved with storage up to 60 days, and although all cheeses had a high flavour score at 120 days, body and texture of the sterilized cheese scored lower than that of the unsterilized cheese. Weight loss occurred throughout storage, especially in the 1st 15 days, and was greater in sterilized than in unsterilized cheeses.

Gilles and Lawrence (1981) discussed modifications in cheese manufacturing procedures that are necessary when recombined milk replaces fresh milk. The authors found that the cheeses made from recombined milk usually possess a slight 'anhydrous milk fat' or 'powder' flavour and the rapid development of a low pH by starter cultures (e.g. in Feta cheese, Cottage cheese) markedly reduces off-flavours resulting from oxidation of the anhydrous milk fat.

El-Gendy et al., (1983) examined Domiati-type cheese which made from equal parts of cows' and buffaloes' milks, either raw or heated. The cheeses were ripened, without using salted whey, by being sealed in polyethylene pouches and stored at ambient temperature (10-25°C) for up to 5 months. Ripening