Microscopical Quality Of Some Local And Imported White Soft Cheeses

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ABSTRACT

This work was carried out to study the microscopical quality of some local and imported white soft cheeses on the presence of foreign matter and filth in the white soft cheeses. Seventy two samples of white soft cheese divided into two main groups, locally produced and imported, (36 each) purchased from different shops in Zagazig City, Sharkia Governorate, Egypt. Samples were submitted to microscopic analyses carried out in Food Control Department, Faculty of Veterinary Medicine, Zagazig University, Egypt. 72.2% of the locally produced cheese samples presented foreign matter and filth, including, in greater amounts, synthetic material fragments (21.9%) and Human Hairs (12.3%), and in smaller amounts, sand grains, macroscopic fragment of synthetic origin and animal hairs (<9.0%). All imported samples were free from filth. The results showed the need for the adoption of quality assurance systems such as Good Agricultural Practices (GAP), Good Manufacturing Practices (GMP) and Standard Sanitary Operational Procedures (SSOP) in order to offer safe products to the consumers, apart from reinforcing official inspection visits to the production units. They also reinforced the importance of using food microscopy as a quality control tool in food processing.

INTRODUCTION

White soft cheese is a product obtained from whole or semi-skimmed milk by enzymatic clotting with rennet and/or other appropriate clotting enzymes, being classified as a semi-fat, high moisture cheese. The product is widely consumed in Egypt, being used as an accompaniment to meals and in a variety of sandwiches. Due to the simple technology used in its manufacture, it is mostly produced by artisans and sold in plastic pots, plastic bags and in pieces (from bulk). It is also commercialised in open markets and other commercial establishments, brined in stalls with no protection against dust and insects, such factors competing for the offer of low quality final products *(1-3)*.

Food microscopy is an area of quality control that aims to search for the presence of foreign matter in foods or expose food frauds, checking the quality of the raw material and the hygiene-sanitary conditions used in the manufacturing process of food products *(1)*. According with **Groves** *(4)*, there is three areas where the microscopy may applied in the food industry: complaints from customers, product failure and new product development. In the second case, it need to be dealt with quickly to protect confidence in the product, brand and industry as a whole.

Despite being easy to execute and providing advantages such as reduced time consumption to obtain results, microscopy is still little used in common practice for quality control in industrial food units. However, the number of studies in this area involving a variety of foods is increasing, demonstrating the importance of this type of analysis as a tool in product quality evaluations *(5, 6)*. In this context, the aim of this research was to evaluate the microscopic quality of some locally produced and imported white soft cheese.

MATERIAL AND METHODS

2.1. Sampling

This work was carried out in the Laboratory of Food control Department, Faculty of Veterinary medicine, Zagazig University, Egypt, using samples of white soft cheese acquired in supermarkets in the municipality of Zagazig City, subjected to Municipal Inspection Service inspections. Two groups of white soft cheese were selected at

random for analysis (locally produced and imported groups). Each group is composed of 36 samples of 12 different commercial brands.

2.2. Analytical procedure

The technique suggested by AOAC, section 960.49C-E and 970.66B was used *(7),* in which 225 g cheese (cut into approximately 6 mm cubes) were placed in a 2 L beaker and 800–1000 ml boiling H3PO4 (1 + 40) added followed by low velocity mixing until the sample was completely dispersed. This mixture was filtered and washed with boiling water to avoid fowling. Although not suggested in the technique, 6.0 ml of detergent and 800–1000 ml boiling water were used, due to difficulties encountered with constant fowling of the pores of the filter paper. The samples were then vacuum filtered through qualitative filter paper (Whatman 40). The filter papers were subsequently examined using a stereoscope and non-identified materials transferred to a slide with glycerine water (1:1), covered with a cover slip and examined under an optical microscope with magnification of X100 to X400, comparing with standards.

2.3. Statistical analyses

Descriptive statistical calculations were applied to the data of each sample to determine the mean using SAS *(8).*

3. Results and discussion

All examined samples of the imported group were free from filth. Table 1 shows the distribution of foreign matter found in the samples of locally produced white soft cheese. A macroscopic evaluation of the outside of the samples showed the presence of fragments of synthetic origin in the locally produced group, probably resulting from the conditions of transport, handling and their commercialisation over supermarket counters. The microscopic evaluation of the cheese samples revealed different foreign matters, such as: fragments of synthetic origin, sand grains, animal hairs or wool and human hairs. Synthetic material fragments (21.9%) and human hairs (12.3%) were found in greater amounts, while animal hairs or wool and macroscopic fragment of synthetic origin (<7.0%) were detected in smaller amounts.

Table 1. Distribution of foreign matter in locally produced white soft cheese.

Foreign matter	Incidence	%
Synthetic material fragments	16	21.9
Human hair	9	12.3
Sand grains	6	8.2
Animal hair or wool	5	6.9
Macroscopic fragments of synthetic origin	4	5.5
Others foreign matter	33	45.2
Total	73	100.0

Table 2. The distribution of filth in locally produced white soft cheese samples analysed.

No. of samples	Foreign materials					
	Synthetic material fragments	Human hair	Sand grains	Animal hair or wool	Macroscopic fragments of synthetic origin	Others foreign matter
1	1	1		1		1
2	1	1		1		1
3	1					1
4	0	0	0	0	0	0
5	1	1				2
6	0	0	0	0	0	0
7		1		1		1
8	1	1			1	2
9			1			1
10	1					1
11	0	0	0	0	0	0
12		1			1	1
13	1					3
14	1					1
15	0	0	0	0	0	0
16	1				1	1
17		1				1
18			1			1
19		1				2
20	1				1	1
21	0	0	0	0	0	0
22	0	0	0	0	0	0
23	0	0	0	0	0	0
24	1					1
25		1	1	1		1
26	1					2
27			1			1
28	1			1		1
29	0	0	0	0	0	0
30	1					1
31	0	0	0	0	0	0
32	1					1
33	1					1
34			1			1
35						1
36			1			1
Total	16	9	6	5	4	33

The presence of these contaminants suggests precarious conditions of hygiene both during the milking procedure and the processing, transport, storage and commercialisation stages, compromising product quality. The presence of animal hairs suggests deficient cleaning and sanitation processes of the installations and equipment. The presence of sand grains suggests that the adoption of good agricultural practices (GAP) was not being correctly followed, reflecting deficient milking conditions, especially in the pre-cleansing of the udder before the actual milking procedure. The fragments of synthetic origin could have come from the materials used to filter the milk before cheese production.

The presence of human hair suggests a lack of hygiene by the workers involved in production, and also the non use of appropriate clothing. The food handlers could spread food poisoning microorganisms to the foods, causing disease, and thus there should be a systematic training of employees, maintenance of hygienic habits and activities and periodical medical examinations of the employees *(9)*. Hairs find entry in food products by several avenues including fecal contamination from animal sources, clothing of animal origin worn by processing personnel, human sources and domestic animals, being necessary to identify the source of contamination *(10)*.

Harris and Degnan (11) emphasize the importance of understanding the significance of microscopic extraneous matter, being essential to conduct detailed investigations in the production areas, including all phases of growth, harvesting, processing, transportation, packaging and storage of food product. Table 2 shows the distribution of filth in locally produced white soft cheese samples analysed.

This can be explained by the potential for variation in the production conditions throughout the processing line, expressed by the lack of standardisation in the activities carried out by the handlers, such as sanitation of the containers and utensils used for cutting the curd in the clotting tank and of the cheese moulds, and the quality of the water used in the process, exposing the same batch of a single product to this vulnerability.

In cheeses, the presence of foreign matter indicates inadequate conditions of hygiene during some stage of the processing. In this case the first stage of the process is obtaining the milk, where contamination may occur as from the actual milking of the cow, and during this process the personal hygiene of the handler and the hygienic conditions of the animal being milked and the installations are fundamental. In this process the main contaminants are: faeces, animal hairs, human hair, earth etc. Another very important stage is the transport of the raw materials. The forms of contamination in the industrial process are varied, extending to the equipment, installations and handlers. Examples are the presence of insects in the structure of the dairy and its machines and the transitory or causal invasion of the dairy by insects through the doors and windows.

In addition the cheese can become contaminated due to inadequate conservation, inappropriate packaging or at the sales point *(12)*. The results found in the present study are similar to those of recent studies involving microscopic analyses and fresh minas-type cheese and others foods of animal origin, demonstrating the importance of microscopic analysis in the quality control of foods, especially in dairy products such as cheese, in order to judge whether the samples are suitable for human consumption. ***Vialta et al. (13)***, verified the microscopic quality of cheeses informally commercialised in the State of Sao Paulo, and registered 99.5% of the cheese samples as containing foreign matter such as human, porcine, bovine, equine and rodent hairs, various types of fibre, sand grains, mites, whole insects and insect fragments.

Pimentel Filho et al. (14), found 814 foreign materials in hand-made minas frescal cheese collected in six cities in the Alto da Paranaı ba area, Brazil. Of these materials, 8% were human and animal hairs and the remaining 92% included barbules, insects, sand and others.

Lima et al. (2), made a microscopic analysis of three different types of cheese: Coalho (clotted) cheese, Manteiga (butter) cheese and Manteiga da Terra (earth butter) cheese, produced in the Brazilian states of Ceara and Rio Grande do Norte. They found that 100% contained foreign matter, including fibres, insect fragments and other filth. ***Peresi et al. (3),*** analysed the microbiologic quality of fresh minas-type cheese manufactured both by artisans and industrially, and commercialised in open markets and in supermarkets in the city of Sao Jose do Rio Preto, Brazil. They verified that 63.6% of the samples produced by artisans and 26.7% of the industrial samples contained foreign matter, insect fragments and animal hairs (including those of rodents) being the most frequent.

Correia and Roncada (1), also analysed three different types of cheese: prato cheese, mozzarella and mineiro cheese, all commercialised in open markets in the city of Sao Paulo, Brazil. Their results indicated that 75.9% of the samples were contaminated with foreign matter. In the case of the prato and mozzarella cheeses, the greater part of the foreign matters found in the contaminated samples were fragments of vegetable origin and cow hairs. 100% of the mineiro cheeses presented external filth in addition to internal contamination. Other types of filth encountered included: mites, rodent hairs and insect fragments. Fig. 1 shows the distribution of foreign matter per brand. Brands J, A and E showed the greatest number of foreign matters such as fragments of synthetic origins, human hairs and other filth, giving evidence of the low product quality. On the other hand, brands D, F and H were free from foreign matters. It must be emphasised that of the cheese brands analysed, 72.2% showed unsatisfactory conditions of hygiene, since they presented foreign matter in general.

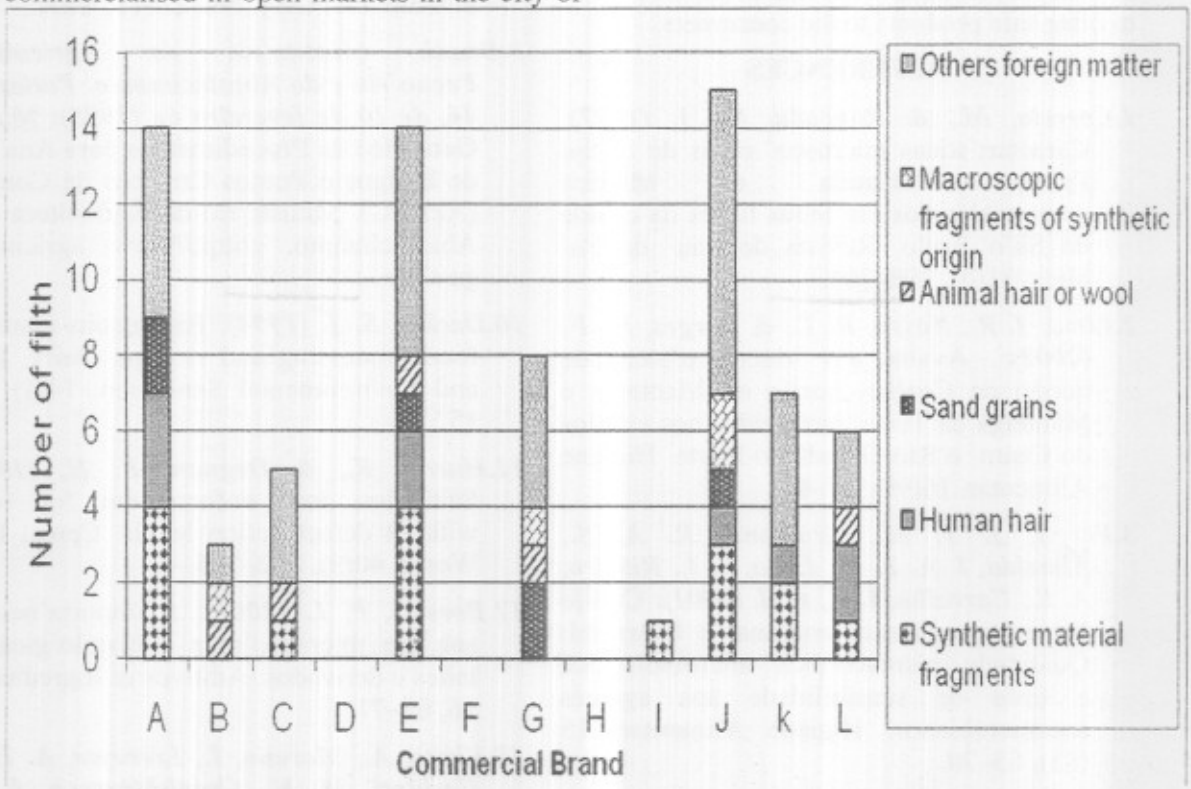

Fig. 1. Distribution of foreign matters per brand.

4. Conclusions

The results of this study emphasise the importance of microscopic analysis as a quality control tool in food processing. 72.2% of the samples of locally produced cheeses failed to meet the standards stipulated by the legislation, the presence of filth and dirt being registered, making them potential risks to human health, since these may be vehicles of food borne diseases. Considering that 100% of the brands analysed were subject to the Municipal Inspection Service, there is a need for more effective control by the official organs in the diverse stages of product processing, such as the conditions for obtaining the raw material and its quality control and the handling and storage of the final product, as well as incentives for the adoption of quality assurance systems such as Good Agricultural Practices (GAP), Good Manufacturing Practices (GMP) and Standard Sanitary Operational Procedures (SSOP), so as to offer safe products to the consumers.

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الملخص العربي
الحالة الميكروسكوبية للجبن الأبيض الطري المصنع محليا والمستورد

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أجريت الدراسة علي اثنتان وسبعين عينة من الجبن الأبيض الطري المصنع محليا والمستورد و التي تم شراؤها من مختلف الأسواق بمدينة الزقازيق بمحافظة الشرقية وذلك لفحصها ميكروسكوبيا لبيان تواجد أية مواد غريبة أو قاذورات في عينات الجبن. و أسفرت الدراسة عن عدة نتائج أهمها خلو الجبن المستورد من أي شوائب سواء ظاهرة بالعين المجردة أو ميكروسكوبية، وأسفرت أيضا عن تواجد الشوائب في حوالي اثنتان وسبعين في المائة من عينات الجبن المصنع محليا. وقد نوقشت الأهمية الصحية للشوائب المعزولة كما طرحت التوصيات الواجب اتباعها لتفادي تواجد مثل هذه الشوائب في منتجات الألبان المختلفة خاصة الجبن.