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Evaluation of dairy products quality collected from Ismailia and Sharkia Governorates, Egypt

Ahmed Mohamed Abdeldaiem and Mohamed Youssef Abouelwafa

Dairy Department, Faculty of Agriculture, Suez Canal University, Ismailia 41522, Egypt.

Abstract

Background and Objective: People in Egypt believes the varied dairy products of supermarkets considered a good quality and certified compared to the same products which obtained from shops or street vendors. Therefore, the present work aims to collect of raw buffalo's milk, yoghurt, karish, mish, domiati and ras cheeses, cream, butter, ice cream and rice pudding from supermarkets and shops of Ismailia and Al-Sharkiah governorates and compared with the same products made according to the official methods. **Materials and Methods:** Buffalo's milk, fresh cream, sugar, table salt, sodium carboxymethyl cellulose and direct vat starter were obtained from Ismailia and Cairo, Egypt. The previous dairy products were purchased from Ismailia and Sharkia Governorates, and the same dairy products were prepared according to the standard methods. All dairy products were analyzed according to according to official methods. **Results:** Generally, the chemical composition, biochemical, sensory and microbiological characteristics of all dairy products which obtained from supermarkets and shops were appeared significant ($p<0.05$) differences compared to control samples. According to the obtained results, most dairy products which collected from supermarkets and shops of each Ismailia and Al-Sharkiah governorates didn't harmonized with the Egyptian Standards (ES). **Conclusion:** The present study showed that the purchased dairy products didn't consistent with the ES according to their analysis. In addition, the increase of monitoring procedures through governmental regulatory agencies on supermarkets and shops besides a heavier punishment for those violate legislative laws became important in the present time.

Keywords: Dairy products, chemical composition, microbiological, biochemical, sensory and microbiological characteristics

INTRODUCTION

As well known the ES of dairy products should be applied for stability of dairy products characteristics forever; in addition the consumers should get the really nutrients for money which paid. The ES consider as an indicator to quality for the consumers, and can be used in activities of government procurement. Therefore, use of the specifications very important to evaluate types of dairy products, which in turn can be met the required specification (AMS,[1]).

Standardized milk according to the ES (ES: 7123[2]) means buffalo, cow, sheep, goat and camel milk; also the milk has been standardized to fat content and milk solid not fat (MSNF), besides no diseases in the animals, physical properties of milk should be without change, no additives, no preservatives and antibiotics, an existence of microorganisms subjected to the allowed limits, moreover absolutely forbidden remove any proportion from the natural ingredients. Milk product can be adulterated by many methods; consequently the end dairy products will be unsatisfying. The low ingredients of adulterated milk can be produced by skimming of milk, addition of water and whey.

Yoghurt product according to the ES (ES:8042[3]) means a fermentative product which formed by strains of *Streptococcus thermophilus* and *Lactobacillus delbrueckii* spp. *bulgaricus* besides flavour, appearance and body characteristics of yoghurt. The product shall have a smooth body no whey separation. Yoghurt product suits all meal occasions and palates (Isleten and Karagul-Yuceer,[4]). Also, its demand has grown in the world (Lee and Lucey,[5]). Both manufacturers and government agencies should taking into account confirm yoghurt sale by vendors in appropriate condition as well as the mobile fridges to temperature control, therefore reduce the contamination (El-Ansary,[6]).

Cheese means the varied dairy product has been achieved by whey off after coagulation process of milk, also cheese contains coagulation factor, cultures, sodium chloride, calcium chloride, carotene or annatto, stabilizers, emulsifiers, citric acid, sodium citrate /or sodium salt of polyphosphoric acid and orthophosphoric acid. Wax used for covering and preventing of cheese from anything harmful to health. Also, the coloured wax shall be applied only to the coloured food (Singh,[7]). The ES has been issued many specifications in respect of cheese whether processed or white soft cheeses through thirteen years ago. Moreover, the ES issued many specification for the white soft cheese, e.g. the ES (ES: 1008-4[8]) of karish cheese states that the fat content in solids material not exceed than 10%, moisture content ≤ 75%, protein and lactose contents within 10 and 4.5% respectively.

Ras cheese represents the main hard cheese in Egypt and similar to kefalotyri and Greek cheeses, as its name means 'head' in the foregoing countries. Now ras cheese distinguished a palatable cheese in Egypt as well in the Arab world (Abou-Donia,[9]). Ras cheese should be pressed besides that a longer shelf life as compared to milk and other dairy products (Ahlam *et al*.[10]). The ES: 154-5 [11] of buffalo butter means the fatty product which obtained from buffalo milk or buffalo cream or a combination thereof by mechanical or manual methods. Butter product should be free from animal fats or vegetable oils and from strange materials. No preservative except salt shall be added. Fat content should be ≥ 80%, MSNF should be ≤ 2%. Moisture contents in salted or unsalted butters not more than 16 or 18% respectively.

Therefore, the objective of present study was summarized in collecting different dairy products from supermarkets (most people think their products have high quality) and shops (most people think their products have low quality) of Ismailia and Al-Sharkiah governorates and compared with the same dairy products made according to the standard methods to realize the final conception for consumers in Egypt.

MATERIALS AND METHODS

Study area: The present study was carried out at Dairy Department, Faculty of Agriculture, Suez Canal University, Ismailia 41522, Egypt from April - September, 2021.

Materials: Fresh buffalo's milk was obtained from the herd of faculty of Agriculture, Suez Canal University, Ismailia, Egypt. Skim milk powder (97% total solids and 1.30% fat) was imported from France and purchased from local market in Ismailia, Egypt. Fresh cream (55% fat and 4.10% MSNF) was purchased from the pilot plant of Dairy Department, Faculty of Agriculture, Suez Canal University, Ismailia, Egypt. Sugar and table salt were purchased from local market in Ismailia, Egypt. Sodium carboxymethyl cellulose (CMC) was purchased from Al Gomhoria Co., (Cairo, Egypt). Direct vat starter (DVS) of yoghurt (*Streptococcus thermophilus* and *Lactobacillus delbrueckii* ssp. *bulgaricus*), and mesophilic starter of karish cheese (*Lactococcus lactis* ssp. *lactis* and *Lactococcus lactis* ssp. *cremoris*) were obtained from

Christian Hansen laboratories, Denmark. Different types of dairy products (Table 1) were purchased from supermarkets and shops of Ismailia and Al Sharkiah governorates, and collected in insulated cooling box (4°C) then analyzed in the same day. All chemicals used in the present experimental were of analytical grade.

Table 1. Types of dairy products collected from Ismailia and Al-Sharkiah governorates

Dairy products	Number of samples				Total samples
	Supermarket		Shop		
	Ismailia	Al-Sharkiah	Ismailia	Al-Sharkiah	
Raw buffalo milk	15	17	15	15	62
Yoghurt	18	15	20	17	70
Ras cheese	15	16	17	14	62
Domiati cheese	16	15	15	17	63
Karish cheese	20	15	20	16	71
Mish cheese	15	18	15	16	64
Butter	17	15	17	15	64
Cream	15	13	16	17	61
Ice cream	17	16	17	15	65
Rice pudding	18	14	20	17	69
Total					651

Methods

Preparations of different dairy products: Yoghurt samples were made as stated by Tamime and Robinson,[12]. Domiati cheese was made as mentioned by Fahmi and Sharara,[13]**.** Karish cheese was manufactured according to the method adopted by Fahmi,[14]. Ras cheese was made according to the traditional method of Abdel-Tawab,[15]. Fresh cream was obtained by skimming of fresh milk using milk cream separator (FJ130ERR, Netherlands). The fresh cream was churned in the churner (Kalsi, India) to produce fresh butter. Ice cream mixes and its products were made as described by Marshall and Arbuckle,[16].

Rice pudding preparation: Preparation of rice pudding was carried out according to Papageorgiou *et al*.[17] with some modifications. White rice grains (10%) were washed by tap water for 5 minutes and soaked in filtered water for 20 min.

Low fat buffalo's milk (2% fat) was heated to 70°C, followed by adding 8% white sugar and rice grains with the stirring. The previous mix was heated up to 95°C until end of cooking process. After cooking process, 0.1% vanilla was added with the stirring, the product was placed in plastic cups and leaved 1 hr at the room temperature. The final product was stored in the refrigerator at 4°C until the analysis.

Analysis of samples: Experimental dairy products were analyzed for total solids (TS), protein content, fat content, salt content, ash content, acidity and water soluble nitrogen (WSN) according to AOAC,[18]. Detection of hydrogen peroxide in buffalo's milk was determined according to method of Recio *et al*.[19]. Detection of sodium carbonate or sodium bicarbonate in buffalo's milk was done according to Miralles *et al*.[20]. Detection of formaldehyde (Hehner's test) in milk was carried out by Panda and Bindla,[21]. Lactose content of samples was determined by Nickerson *et al*.[22]. Ascorbic acid was estimated using the method of Osborne and Voogt,[23]. Acetaldehyde was determined as described by Lees and Jago,[24]. Syneresis was determined according to Lorenzen *et al*.[25].

The freezing point, specific gravity, overrun and weight per gallon of ice cream mixes were established according to method of Marshall and Arbuckle,[16]. Melting rate of ice cream was evaluated as implemented by Segall and Goff,[26]. Total plate count (TPC) and presumptive coliform count of different samples were determined according to American Public Health Association[27].

pH value: The pH values of samples were measured using a digital pH meter (Jenway electrode no. 3505, Dunmow, England).

Free amino acids: The free amino acids (FAA) values were estimated using cadmium-ninhydrin method as described by Folkertsma and Fox,[28]. Cd-ninhydrin reagent: 0.8 g ninhydrin were dissolved in a mixture of 80 ml 99.5% ethanol and 10 ml acetic acid, followed by the addition of 1 g $CdCl_2$ dissolved in 1 ml of distilled water. A sample 100 µl of WSN was diluted to 1 ml with distillated water. 2 ml Cd-ninhydrin reagents was added. The mixture was heated at 84ºC for 5 min cooled and the absorbance at 507 nm was measured using Varian Cary

(UV/Visible double beam) spectrophotometer (Varian Australia Pty. Ltd). A blank (reagent without WSN) was prepared.

Determination of rice percentage in rice pudding: Weigh 20 g from rice pudding in glass container, placed in strainer and leaved 10 min to drain other components. The remained rice washed many times using a slight stream of tape water to remove the residual components, and then rinsed using distilled water. The remained rice leave 30 min in the strainer and then dried in the oven at 70°C / 15 hrs. Rice percentage = (weighed of sample after drying/weighed of sample before drying) × 100.

Sensory evaluation: Ras, domiati, karish and mish cheeses, butter, cream, ice cream and rice pudding of the present study were evaluated by 11 panelists of staff members of Dairy Department, Faculty of Agriculture, Suez Canal University. The flavour = 50 points, body and texture = 40 points and appearance and colour = 10 points. Ice cream treatments were analyzed using the scale of 9-point hedonic according to Stone and Sidel,[29]. The parameters of sensory evaluation contains flavour, body and texture, colour and appearance, melting quality and overall acceptability.

Statistical analyses: Statistical analyses of all treatments were carried out by the two-way analyses of variance using computer program software SAS (The SAS system, version 8 for Windows, USA). A Duncan analysis was used to evaluate the significant differences ($p<0.05$) between different means.

RESULTS AND DISCUSSION

Raw buffalo's milk: The chemical composition, biochemical and microbiological properties of buffalo's milks besides adulteration tests are given in Table 2. Raw buffalo's milk was evaluated via the experimental examinations as a quality indicator. The significant ($p<0.05$) changes between chemical composition of control, supermarket and shop samples were observed. In addition, the buffalo's milk of control occupied higher results, followed by supermarket and then shop samples. As well known the control sample were consists with the ES: 7123[2] as contained 6.45% fat and 9.80% MSNF. Adulteration of dairy products associated with occurrence an inferior in the nutritional value (Ghita *et al*.[30]) and probably causes contamination due to negligence, ignorance or lack of suitable facilities (Kamthania *et al*.[31]). The present study has been recorded positive results with Hehner's test for shop samples, while other samples exhibited negative results. The biochemical examinations showed that the acidity and pH values of supermarket and control samples were close together compared to shop samples.

With regard to the microbiological criteria, the presumptive test of coliform bacteria showed that no occurrence coliform bacteria in all samples; on the other hand the TPC of supermarket samples occupied the first order followed by controls, while shop samples exhibited zero cell forming unit (cfu)/ml. Gomaa *et al*.[32] found the TPC of buffalo's milk was recorded as $4.97\times10^6\pm2.16\times10^6$ cfu.ml^{-1}, in addition the coliform counts was more than 1100 most probable number /ml.

Shop samples has been adulterated with formaldehyde, therefore no development in the acidity was observed, and the TPC besides presumptive test of coliform were donated negative results. The presence of coliform is an indication for post contamination due to poor personal hygiene, environment and unclean equipment (Goff,[33]). The rising of TPC in raw milk considered a serious fault owing to handling processes beside insufficient of chilling facilities during the transportation (Mahari and Gashe,[34]), furthermore the chemical examinations appeared that the milk of supermarket and shop were skimmed and the shops milk were cheated by water adding. Ahlam *et al*.[10] reported that a high contaminated from TPC, coliform, *Staphylococcus aureus* besides mold and yeast counts were noticed in the raw milk.

Table 2. Chemical composition, biochemical and microbiological properties of buffalo's milk

Parameters	**Buffalo's milk**		
	C*	**Supermarket**	**Shop**
	Chemical composition▼		
TS (%)	16.25±0.17^a	14.21±0.12^b	10.77±0.10^c
Fat (%)	6.45±0.10^a	4.33±0.13^b	2.50±0.11^c
Protein (%)	4.17±0.12^a	3.87±0.10^b	3.34±0.11^c
Lactose (%)	4.95±0.12^a	4.80±0.14^a	4.52±0.13^b
Ash (%)	0.82±0.02^a	0.72±0.04^b	0.65±0.02^c
	Adulteration tests▼		

Detection of formaldehyde■	–	–	+
Detection of sodium carbonate■ or bicarbonate	–	–	–
Detection of hydrogen peroxide■	–	–	–
Biochemical properties▼			
Acidity (%)	0.17 ± 0.01^{a}	0.16 ± 0.02^{ab}	0.13 ± 0.01^{b}
pH values	4.64 ± 0.08^{b}	6.68 ± 0.11^{a}	6.83 ± 0.10^{a}
licrobiological properties▼			
TPC (cfu.ml^{-1})	$65\times10^{4}\pm23\times10^{3b}$	$17\times10^{7}\pm5\times10^{6a}$	Zero^{c}
Coliform	–	–	–

Small letters: mean values are significant ($p<0.05$) with different letters for the row of parameters; C*: control; ▼: mean values; ■: qualitative test; +: positive; –: negative

Yoghurt samples: The chemical composition, biochemical, sensory and microbiological properties of yoghurt are tabulated in Table 3. Results of each supermarket and shop samples compared to yoghurt controls were not compatible with the ES:8042[3], in addition the chemical, biochemical and sensory properties of controls were higher significantly ($p<0.05$) (except the acidity and syneresis) followed by supermarket samples and then shop samples. In respect of the microbiological aspects, no coliform bacteria observed in all treatments, while the TPC of shop > supermarket > control samples.

Remarkable, the statistical ($p<0.05$) variations in the biochemical properties between all yoghurt samples were distinguished, moreover samples of supermarket, shop and control were higher in pH values, acidity & syneresis and ascorbic acid & acetaldehyde respectively. According to the panelists point view, control samples were recorded higher scores, followed by supermarket samples and then shop samples. The early study of El-Ziney,[35] revealed that the heat treatment, fermentation time and pH of end product can be created survival of inadequate bacteria.

No coliform counts were observed in all treatments, whereas shop samples has higher TPC than supermarket and then control samples. Yoghurt product should be ≥ 5.5% fat, ≥ 8.75% MSNF, ≤ 1.5% acidity, ≤ 10 cell colon/g, nil *E. coli* and ≤ 10 cell fungi/g according to the ES:8042[3]. Therefore, the examinations of supermarket samples were in agreement with the ES. Tamine and Robinson,[12] illustrated that the detection coliforms bacteria in yoghurt samples mostly used as criteria for estimate the quality.

Table 3. Chemical composition, biochemical, sensory and microbiological properties of yoghurt

Parameters	**Yoghurt▼**		
	C*	**Supermarket**	**Shop**
	Chemical composition		
TS (%)	17.30 ± 0.16^{a}	16.20 ± 0.17^{b}	9.40 ± 0.12^{c}
MSNF (%)	10.73 ± 0.13^{a}	10.30 ± 0.14^{b}	7.10 ± 0.10^{c}
Fat (%)	6.50 ± 0.13^{a}	5.70 ± 0.10^{b}	2.25 ± 0.04^{c}
Protein (%)	4.32 ± 0.10^{a}	3.55 ± 0.08^{b}	2.74 ± 0.06^{c}
Ash (%)	$0.\ 87\pm0.02^{a}$	0.82 ± 0.03^{b}	0.61 ± 0.02^{c}
Biochemical properties			
Acidity (%)	0.73 ± 0.02^{c}	0.84 ± 0.01^{b}	0.91 ± 0.02^{a}
pH values	4.64 ± 0.05^{a}	4.57 ± 0.04^{a}	4.42 ± 0.05^{b}
Ascorbic acid (mg/100 g)	1.67 ± 0.04^{a}	1.53 ± 0.02^{b}	1.37 ± 0.03^{c}
Acetaldehyde (ppm)	4.94 ± 0.10^{a}	4.22 ± 0.11^{b}	3.50 ± 0.07^{c}
Syneresis (ml whey / 25 g)	8.72 ± 0.12^{c}	9.85 ± 0.14^{b}	11.90 ± 0.10^{a}
Sensory properties			
Appearance (10)	9.10 ± 0.14^{a}	8.15 ± 0.12^{b}	6.11 ± 0.13^{c}
Body and texture (40)	37.93 ± 0.82^{a}	36.43 ± 0.75^{b}	28.27 ± 0.63^{c}
Flavour (50)	47.75 ± 1.05^{a}	43.45 ± 0.94^{b}	39.53 ± 0.87^{c}
Microbiological properties			
TPC (cfu.ml^{-1})	$50\times10^{3}\pm9\times10^{3c}$	$15\times10^{4}\pm3\times10^{4b}$	$60\times10^{5}\pm15\times10^{5a}$
Coliform	–	–	–

See footnote Table 2

Different cheese samples

Karish cheese: Karish cheese is described a low in fat content and the price (Abou-Donia,[9] and Abd-El-Salam *et al*.[36]), also its flavour, texture and colour have substantial role for consumers acceptation (Randazzo *et al*.[37]). Karish cheese affected by many factors such as type of milk and its pre-treatment, milk production season, microflora, starter addition, coagulants, milk additives, temperature and the storage periods (Todaro,[38]). As shown in Table 4 (a), the chemical, biochemical, sensory and microbiological characteristics has been exhibited significant ($p<0.05$) differences between sources of karish cheeses. The ES: 1008-4[8] of karish cheese pointed that the parameters should be ≤ 75% moisture, ≤ 10 fat/dry matter (F/DM) ratio, ~ 10% protein, ≤ 10 cell colon /g and nil *E*. *coli*, thus both supermarket and shop cheeses were compatible with control cheese. The previous study by Korish and AbdElhamid,[39] stated that the ingredients of karish cheese were 16.70% protein, 0.1% fat and 3.98% lactose, on the other hand, Todaro,[38] showed that the protein level of karish cheese was 19.99%.

Egyptian mish cheese (Jibnet mish): Table 4 (a) represents the significant ($p<0.05$) changes between results of supermarket and shop mish cheeses has been observed. In spite of that the treatments of each supermarket and shop weren't consistent with the ES: 4342[40] due to the specification parameters should be ≥ 35% TS, ≥ 5% fat, ≤ 15% salt, ≤ 10 cell colon/g and nil *E*. *coli*. The variation between chemical characteristics of cheese sources presumably related to the differences in milk composition
(Aly *et al*.[41]). Any cheese type has microbiological characteristics, i.e. temperature, salt and acid tolerance, initial counts and an individual properties of strains and species (Beuvier and Buchin,[42]). Both supermarket and shop samples recorded positive results concerning coliform bacteria, moreover the coliform bacteria in cheese were an indicator to unhealthy practices during all production steps beside the end products. Also, coliform numbers considered an index for the faecal contamination (Cakmakci *et al*.[43] and Ozdemir *et al*.[44]).

Domiati cheese: Table 4 (b) shows the significant ($p<0.05$) differences between all parameters of the three domiati cheeses has been observed. Concerning the chemical composition of cheeses, the control, supermarket and shop samples were obtained high values in protein content, (TS, fat and ash contents and F/DM ratio) and salt content respectively. The control samples have been distinguished than other treatments in the biochemical and sensory properties (except pH values), which can be explained by an increase of control samples in protein content compared to other samples, moreover the protein content has a substantial role in ripening process and associated with the ripening indices such as the FAA and WSN. The criteria of full fat domaiti cheese has been reported by the ES: 10083[45], wherein its values should be ≤ 58% moisture, ≥ 45% to ≤ 60% F/DM ratio, ~10% protein, ~9% salt, ≤ 10 cell colon /g and nil *E*. *coli*, thus the cheeses of supermarket and shop weren't met control cheese in protein content. Ghita *et al*.[30] revealed that the examined white soft cheese appeared low protein and high fat contents. Domiati cheeses were ordered according to the TPC as a follows: supermarket > shop > control. In case of the presumptive test of coliform bacteria, all treatments were recorded non existence coliform bacteria. Previously, $0.26 \times 10^6 \pm 0.14 \times 10^5$ TPC and $0.13 \times 10^3 \pm 0.15 \times 10^2$ coliforms has been reported by Aly *et al*.[41] in domiati cheese, also a positive relation between TPC and moisture level was noticed, in contrast the negative correlation between TPC, pH value and salt content has been reported. The increase of TPC in domiati cheese were associated with the producing and ripening processes (ElBaradei *et al*.[46])

Ras cheese: As shown in Table 4 (b), the chemical, biochemical, sensory and microbiological characteristics of control ras cheese has higher significant ($p<0.05$) results than supermarket and shop samples, moreover samples of Ismailia and Al-Sharkiah governorates weren't subjected to the ES: 1007-5[47]. The ES of ras cheese pointed to the cheese milk should be pasteurized, also the pathogenic microbes, *E*. *coli* and its toxins, coliform should be free in cheese beside that the total mould count ≤ 10 cfu.g^{-1}. The variations in gross composition of all samples were influenced by milk quality, procedures of cheese making and ripening circumstances (Aly *et al*.[41]). Ahlam *et al*.[10] showed that the TPC and coliform counts of ras cheese after 3 and 6 months were $2.05 \times 10^5 \pm 1.03 \times 10^5$ & $1.44 \times 10^2 \pm 2.14 \times 10$ and $1.04 \times 10^8 \pm 5.86 \times 10^7$ & $0.2 \times 10 \pm 0$. Also, the poor hygiene aspects, not cooling of raw milk from farm till the factory were attributed to an increase numbers of both TPC and coliforms.

Table 4 (a). Chemical composition, biochemical, sensory and microbiological properties of Karish and Mish cheeses

Parameters	Karish cheese▼			Egyptian Mish cheese (Jibnet Mish)▼		
	C*	Supermarket	Shop	C*	Supermarket	Shop
	Chemical composition			Chemical composition		
TS (%)	23.75±0.84^{a}	23.14±0.70^{a}	22.87±0.76^{a}	ND	33.17±0.93^{a}	31.16±0.77^{b}
Fat (%)	1.81±0.04^{a}	1.78±0.05^{a}	1.50±0.03^{b}	ND	4.85±0.12^{a}	3.75±0.10^{b}
F/DM ratio	7.62±0.18^{a}	7.69±0.23^{a}	6.56±0.15^{b}	ND	14.62±0.31^{a}	12.03±0.26^{b}
Protein (%)	17.74±0.10^{a}	16.88±0.22^{b}	17.27±0.17^{c}	ND	16.10±0.18^{a}	15.45±0.13^{b}
Salt (%)	1.31±0.03^{c}	1.77±0.04^{a}	1.61±0.02^{b}	ND	7.76±0.13^{a}	6.57±0.15^{b}
Ash (%)	1.72±0.05^{b}	1.84±0.03^{a}	1.61±0.04^{c}	ND	3.56±0.11^{b}	4.64±0.08^{a}
Biochemical properties				Biochemical properties		
Acidity (%)	1.67±0.03^{c}	1.81±0.02^{b}	1.92±0.02^{a}	ND	2.85±0.02^{b}	3.07±0.04^{a}
pH values	4.48±0.05^{a}	4.40±0.04^{ab}	4.35±0.05^{b}	ND	4.28±0.04^{a}	4.18±0.06^{b}
WSN (%)	0.401±0.010^{c}	0.434±0.012^{b}	0.475±0.014^{a}	ND	0.502±0.021^{b}	0.583±0.031^{a}
Sensory properties				Sensory properties		
Appearance (10)	9.11±0.17^{a}	8.17±0.15^{b}	6.27±0.18^{c}	ND	8.14±0.10^{a}	7.95±0.12^{b}
Body and texture (40)	38.50±0.45^{a}	37.24±0.66^{b}	34.56±0.28^{c}	ND	33.91±0.83^{b}	35.92±0.95^{a}
Flavour (50)	47.40±0.81^{a}	45.24±0.75^{b}	41.72±0.67^{c}	ND	43.42±0.90^{b}	45.06±0.86^{a}
Microbiological properties				Microbiological properties		
TPC (cfu.g^{-1})	25×10^{4}±3×10^{4c}	70×10^{5}±10×10^{5b}	35×10^{7}±3×10^{7a}	ND	20×10^{4}±5×10^{4b}	55×10^{5}±9×10^{5a}
Coliform	–	–	–	ND	+	+

ND: not detect; See footnote Table 2

Table 4 (b). Chemical composition, biochemical, sensory and microbiological properties of Domiati and Ras cheeses

Parameters	Domiati cheese▼			Ras cheese▼		
	C*	Supermarket	Shop	C*	Supermarket	Shop
	Chemical composition			Chemical composition		
TS (%)	47.83±0.56^{b}	49.17±0.76^{a}	48.21±0.63^{ab}	63.05±0.85^{a}	58.71±1.11^{b}	57.92±0.92^{b}
Fat (%)	25.55±0.47^{c}	29.85±0.15^{a}	27.43±0.56^{b}	31.35±0.16^{a}	27.92±0.73^{b}	25.46±0.14^{c}
Fat / DM ratio	49.24±0.80^{c}	60.71±0.94^{a}	56.90±0.75^{b}	49.72±0.63^{a}	47.56±0.75^{b}	43.96±0.44^{c}
Protein (%)	13.88±0.14^{a}	6.13±0.07^{b}	5.90±0.11^{c}	25.41±0.15^{a}	24.06±0.65^{b}	25.73±0.31^{a}
Salt (%)	5.87±0.07^{c}	10.51±0.10^{b}	12.42±0.11^{a}	2.45±0.03^{c}	2.79±0.04^{b}	2.92±0.02^{a}
Ash (%)	2.38±0.03^{b}	2.45±0.02^{a}	2.31±0.05^{ab}	3.84±0.06^{ab}	3.94±0.07^{a}	3.81±0.04^{b}
Biochemical properties				Biochemical properties		
Acidity (%)	2.40±0.05^{a}	2.18±0.04^{b}	2.01±0.02^{c}	2.27±0.02^{c}	2.53±0.03^{b}	2.72±0.02^{a}
pH values	4.76±0.04^{b}	4.85±0.07^{ab}	4.88±0.05^{a}	4.57±0.08^{b}	4.63±0.07^{b}	4.77±0.05^{a}
FAA /100 µl WSN	0.173±0.014^{a}	0.131±0.010^{b}	0.124±0.012^{b}	0.833±0.016^{a}	0.725±0.010^{b}	0.677±0.012^{c}
WSN (%)	0.26±0.02^{a}	0.20±0.02^{b}	0.19±0.01^{b}	0.77±0.03a	0.71±0.04^{ab}	0.65±0.02^{b}
Sensory properties				Sensory properties		
Appearance (10)	9.20±0.13^{a}	8.73±0.12^{b}	8.34±0.10^{c}	9.25±0.10^{a}	9.10±0.15^{a}	8.32±0.12^{b}
Body and texture (40)	38.60±0.36^{a}	36.91±0.45^{b}	35.15±0.41^{c}	38.57±0.41^{a}	37.13±0.47^{b}	32.57±0.51^{c}
Flavour (50)	48.50±0.57^{a}	48.13±0.62^{a}	41.34±0.36^{b}	48.75±0.50^{a}	47.04±0.46^{b}	40.60±0.35^{c}
Microbiological properties				Microbiological properties		
TPC (cfu.g^{-1})	11×10^{3}±2×10^{3c}	5×10^{4}±11×10^{3b}	45×10^{5}±5×10^{5a}	70×10^{5}±11×10^{5c}	21×10^{7}±2×10^{7b}	13×10^{8}±3×10^{7a}
Coliform	–	–	–	–	–	–

See footnote Table 2

Dairy-fat products

Cream and butter: Table 5 shows the differences between types of cream samples were significant ($p<0.05$), moreover the ES: 154-2[48] which compatible with control samples showed that the fatty product should be naturally in appearance and flavour properties, no *E. coli*, no rancidity, free from the strange substances, milk fat only base of cream product, ≤ 10 cell colon /g in pasteurized cream and ≤ 0.20% acidity in fresh cream. Consequently the supermarket and shop samples incompatible with the ES. In respect of butter samples, the examinations exhibited significant ($p<0.05$) differences between control, supermarket and shop treatments. In addition, the controls have high fat content besides its distinguished in biochemical, sensory and microbiological properties than butter samples of supermarket and shop. Furthermore, the control samples were

accompanied with the ES: 154-5[11], but supermarket and shop samples were inconsistent.

Table 5. Chemical composition, biochemical, sensory and microbiological properties of butter and cream

Parameters	Heavy cream (double cream)▼			Butter from buffalo's milk (unsalted)▼		
	C*	Supermarket	Shop	C*	Supermarket	Shop
	Chemical composition			**Chemical composition**		
Moisture (%)	43.60±0.55^{c}	50.52±0.64^{a}	47.37±0.71^{b}	13.85±0.16^{c}	15.22±0.13^{b}	23.33±0.25^{a}
Fat (%)	45.40±0.38^{a}	42.12±0.23^{c}	44.42±0.52^{b}	84.65±0.94^{a}	82.12±0.85^{b}	73.20±0.78^{c}
Protein (%)	2.18±0.03^{c}	2.37±0.04^{a}	2.28±0.03^{b}	0.80±0.03^{c}	0.95±0.04^{b}	1.10±0.02^{a}
Lactose (%)	2.50±0.04^{c}	3.11±0.05^{a}	2.87±0.06^{b}	0.08±0.05^{a}	0.09±0.03^{a}	0.10±0.03^{a}
Ash (%)	0.55±0.02^{a}	0.50±0.03^{b}	0.54±0.02^{ab}	2.10±0.04^{a}	1.95±0.05^{b}	1.82±0.03^{c}
Biochemical properties				**Biochemical properties**		
PVs (mEq O_2 /kg fat)	0.331±0.011^{b}	0.470±0.015^{a}	0.465±0.017^{a}	0.392±0.012 ^{c}	0.485±0.020 ^{b}	0.596±0.011^{a}
Sensory properties				**Sensory properties**		
Appearance (10)	9.27±0.10^{a}	8.83±0.11^{b}	8.87±0.07^{b}	9.43±0.12^{a}	8.33±0.10^{b}	6.72±0.07^{c}
Body and texture (40)	38.50±0.30^{a}	37.07±0.27^{b}	38.53±0.36^{a}	39.14±0.92^{a}	38.56±0.65^{a}	30.71±0.70^{b}
Flavour (50)	48.60±0.75^{a}	45.26±0.81^{b}	42.87±0.44^{c}	48.80±0.66^{a}	45.82±0.73^{b}	41.76±0.38^{c}
Microbiological properties				**Microbiological properties**		
TPC (cfu.g^{-1})	50×10^{5}±20×10^{4c}	25×10^{6}±3×10^{6b}	14×10^{8}±4×10^{6a}	10×10^{2}±4×10^{2c}	7×10^{3}±2×10^{3b}	70×10^{5}±8×10^{5a}
Coliform	–	+	–	–	–	–

See footnote Table 2

Rice pudding: Rice pudding was produced at home and small dairy plants, but now the production has been increased due to its became familiar for large sector of consumers. As shown in Table 7, the chemical, biochemical, sensory and microbiological properties. Table 6. Characteristics of ice cream types showed that the differences between the three samples were significant ($p<0.05$). The sensory evaluation of control treatment was obtained high scores, followed by supermarket and then shop samples. No microorganisms were observed in all treatments, which can be related to use high heat treatment for rice pudding production. The early study of Papageorgiou *et al*.[17] showed that the values of moisture content (74.12%), fat / DM ratio (11.79%), carbohydrates (18.75%), protein (3.31%) and pH values (6.60–6.67) were recorded for the rice pudding. Secim and Ucar,[51] found the values of total aerobic mesophilic microorganisms and coliform were 2.63±0.33 (log cfu) log10 and 0.66±0.44 (log cfu) log10 respectively in the rice pudding.

CONCLUSION

Collection of raw buffalo's milk, yoghurt, karish, mish, domiati and ras cheeses, cream, butter, ice cream and rice pudding from supermarkets and shops of Ismailia and Sharkia governorates showed that an incompatible with the same standard dairy products. In addition, people's which believed the superiority of supermarket dairy products than same dairy products of shops has became wrong.

Moreover, there are some suggestions can be applied in the future, such as source, origin, storage and shelf life of different dairy products which will reach to supermarkets and shops. These suggestions need to more investigations to apply the prevents measures and prevent or decrease hazards, which in turn will be benefit for dairy products safety and then consumers. Ultimately, the increase of monitoring for supermarkets and shops should be a major requirement besides an important priority of Governmental regulatory agencies for protection and safety of consumers.

Parameters	Ice creams▼		
	C*	Supermarket	Shop
	Chemical composition		
TS (%)	31.20±0.44[b]	21.74±0.35[c]	33.06±0.47[a]
Fat (%)	6.00±0.07[a]	3.35±0.05[c]	6.20±0.10[b]
Protein (%)	8.30±0.14[a]	4.11±0.08[c]	7.10±0.11[b]
Physical properties of ice cream products			
pH values	6.44±0.02[c]	6.71±0.03[b]	6.80±0.02[a]
Freezing point (°C)	– 2.31±0.02[b]	– 2.21±0.03[a]	– 2.33±0.03[b]
Specific gravity	0.695±0.0008[a]	0.651±0.0007[b]	0.587±0.0008[c]
Weight per gallon (kg)	3.1593±0.0010[a]	2.9593±0.0008[b]	2.6683±0.0009[c]
Sensory properties			
Flavour (9)	9.35±0.17[a]	8.33±0.12[b]	8.07±0.15[b]
Body and texture (9)	9.54±0.10[a]	8.10±0.15[b]	8.04±0.09[b]
Melting quality (9)	9.21±0.18[a]	8.16±0.13[b]	8.11±0.08[b]
Colour and appearance (9)	9.17±0.14[a]	8.77±0.10[b]	8.25±0.13[c]
Overall acceptability (9)	9.56±0.12[a]	8.36±0.16[b]	8.10±0.10[c]
Microbiological properties			
TPC (cfu.g^{-1})	57±22[2c]	9×10^{2}±3×10^{2b}	33×10^{2}±4×10^{2a}
Coliform	–	–	–

See footnote Table 2

Table 7. Examinations of rice pudding treatments

Parameters	Rice pudding▼		
	C*	Supermarket	Shop
	Chemical composition		
TS (%)	22.60±0.25[a]	22.12±0.32[ab]	21.87±0.22[b]
Fat (%)	1.90±0.02[a]	1.10±0.03[b]	1.05±0.05[b]
Protein (%)	3.67±0.05[a]	3.34±0.07[b]	3.21±0.03[c]
Ash (%)	1.48±0.04[a]	1.42±0.03[a]	1.31±0.03[b]
Rice (%)	2.75±0.04[c]	3.03±0.05[b]	3.87±0.03[a]
Biochemical properties			
Acidity (%)	0.18±0.02[b]	0.17±0.02[b]	0.27±0.03[a]
pH values	6.62±0.08[a]	6.60±0.06[ab]	6.48±0.05[b]
Sensory properties			
Appearance (10)	9.50±0.18[a]	8.23±0.16[b]	7.11±0.11[c]
Body and texture (40)	38.90±0.48[a]	36.71±0.37[b]	32.42±0.38[c]
Flavour (50)	48.65±0.67[a]	44.17±0.85[b]	40.47±0.73[c]
Microbiological properties			
TPC (cfu.g^{-1})	Zero	Zero	Zero
Coliform	–	–	–

See footnote Table 2

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