Journal of Sohag Agriscience (JSAS) 2024, 9(2): 154-162

ISSN 2357-0725
https://jsasj.journals.ekb.eg
JSAS 2024; 9(2): 154-162

Received: 19-10-2024
Accepted: 05-11-2024

Abd-Ellah A. Abd-Alla
Ateteallah H. Ateteallah
Amira K. Ibrahim

Dairy Sciences Department
Faculty of Agriculture
Sohag University
Sohag
Egypt

Assessment of Chemical and Microbiological Properties of Rural Kareish Cheese Collected from Different Locations of Sohag Governorate

Abd-Ellah A. Abd-Alla, Ateteallah H. Ateteallah and Amira K. Ibrahim

Abstract

In this study, sixty samples of Kareish cheese were randomly collected from four different cities in Sohag Governorate, Egypt to estimate their chemical and microbiological quality. According to the results, the values of Kareish cheese's moisture content, total solid content, acidity, salt, fat, fat/dry matter, total nitrogen, total protein, total protein/dry matter, and soluble nitrogen ranged from 57.01 to 75.63, 24.36 to 45.57, 0.42 to 1.98, 1.18 to 3.79, 2.30 to 4.46%, 8.06 to 13.86, 2.24 to 3.17, 14.30 to 20.49, 38.87 to 71.69, and 0.19 to 0.46, respectively. Moreover, the total bacterial counts varied from 5.84 to 8.55. All 60 samples included detections of *E. coli*, *Shigella* & *Salmonella* and molds & yeasts. The counts of these microorganisms varied from 2.38 to 5.47, 2.45 to 3.38, and 2.23 to 2.62 (log cfu/g), respectively. The results of the microbiological and chemical analyses varied significantly ($p<0.05$) among the collection sites.

Keywords: Hygienic, Chemical, Microbiological, quality; Rural Kareish cheese

Corresponding author:
Amira K. Ibrahim
amira.kh2442@gmail.com

INTRODUCTION

Kareish cheese is a soft acid cheese made from skimmed cow's milk, buffalo milk, or buttermilk from sour cream; it's made only on farm steads. It is one of the most important traditional Egyptian dairy products, commonly made in the Egyptian countryside, especially in small villages, as low-income people such as farmers use Kareish cheese in their diet owing to its high protein content, low fat, and price. Therefore, nowadays, Kareish cheese is a promising food for the avoidance of health problems associated with fat, particularly for old people (Todaro *et al.,* 2013) Kareish cheese is a type of soft cheese commonly made and consumed in Egypt. However, the use of raw milk leads to either unpredictable chemical or biological changes or the possible survival of various pathogens (Deeb *et al.,* 2004). Kareish cheese is prepared from skimmed cow or buffalo milk, or a combination of the two. Direct milking of cows or buffaloes is done into special earthenware pots, which are then left undisturbed in a suitable location for the fat to rise to the surface and form a cream layer, and the partially skimmed milk to sour and clot (which is produced within 24-36 hours during the summer and two- or three-days during winter). After the cream layer is removed, the curd is poured onto a mat and its contents are tied and hung to allow the whey to drain until the desired texture of the cheese is achieved. When the cheese has been properly sliced and salted, it is ready to be eaten as fresh cheese, the fresh cheese has a one- to two-week shelf life (Todaro *et al.,* 2013). Kareish cheese is one of the indigenous white soft cheese types in Egypt which it's made from skim milk with starter culture. It has become trendy because of its remarkable health quality as the only known fat-free cheese consumed by the Egyptians. It's often recommended for persons suffering from obesity and heart disease (Hofi *et al.,* 2004). Food-borne pathogens, which contaminate milk throughout the dairy farm environment and are excreted from the udder of an infected animal, are present in milk and its products in significant amounts (Khalifa1 & Nossair, 2016). Microorganisms such as *S. aureus, E. coli* O157:H7 and Salmonella spp. Conceders are the most prevalent food-borne diseases (Cokal *et al.,* 2012). The existence of numerous types of bacteria is regarded as inappropriate for consumption and creates a public health danger (Todaro *et al.,* 2013). Even if industrial production techniques are used in Egypt to manufacture Kareish cheese with safe and uniform qualities, people still prefer the traditional version since it is less expensive and has an intact organoleptic quality. The aim of this investigation was to assess the chemical and microbiological characteristics of Kareish cheese, which is customarily produced in the Sohag Governorate of Egypt

MATERIALS AND METHODS

Materials

Sampling:

Sixty samples of Kareish cheese were randomly collected under different conditioning of manufacturing processes (traditional made by leaving the raw milk for coagulation by natural flora and then collecting the fat layer. Egyptian Standard 4-1008/2005), storage, handling. But transferred under same conditioning of sterile bags and bottles in ice box to the laboratory and stored at refrigerator temperature (5 ± 1°C) until procedure the chemical and microbiological analysis. samples were Collected were from different four cities in Sohag Governorate, Egypt. Sohag; Dar El-Salam, Girga, and Tima.

Medium:

Potato dextrose agar was obtained from Lab M, United Kingdom. Nutrient agar and Salmonella-Shigella agar were obtained from Laboratories CONDA, Spain. MacConkey agar was obtained from Hi Media Laboratories, India.

Methods

Chemical Analyses:

Chemical analyses in cheese samples include moisture, total solids (TS), fat, total nitrogen (TN), soluble nitrogen (SN), salt, and titratable acidity (TA) were determined according to AOAC (2010).

Microbiological Analyses:

The total bacterial count was determined according to Marshal (2004). *E. coli* count was enumerated according to AOAC (2010). *Salmonella* and *Shigella* were investigated according to ICMSF, 1996; James and Natalie (2002). Molds & yeasts were enumerated according to FDA (2002).

Statistical Analysis

The data obtained in the present study was analyzed by ANOVA. For all analyses, when a significant difference ($p < 0.05$) was detected in some variable, the data means test was applied to evaluate the difference between the samples (Steel& Torrie,1980). The results were analyzed with the aid of the software SAS System for Windows (SAS, 2008).

RESULTS AND DISCUSSION

Chemical composition of collected Kareish cheese samples.

The information shown in Table 1 made the chemical makeup of the Kareish cheeses that were gathered from the chosen cities and places in the Sohag governorate clearer. The samples were collected from the following cities: Sohag, Dar El-Salam, Girga, and Tima. The research showed that the diverse locations for sample collection had an impact on the chemical makeup of Kareish cheese.

Moisture and Total Solid content:

The data in Table 1 showed that the moisture content of the samples in the Kareish cheese from the same center did not differ significantly, however, the samples from other centers do differ significantly ($p<0.05$). In addition, the moisture content of the Kareish cheese samples ranged from 57.01 to 75.63%, respectively. The moisture values in some samples were higher than mentioned in the Egyptian standards for Kareish cheese No. 4-1008/2005 (moisture not exceeding 75%). The identical specimens demonstrated a large variance in total solid values between Kareish cheese samples from distinct centers, but not between samples from the same center. Samples of Kareish cheese had total solid contents ranging from 24.36 to 45.57%. Girgra city (45.57) scored the greatest total solid, while Sohag city (24.36) recorded the lowest. Girgra city had the lowest moisture percentage (57.01%), while Sohag city had the greatest moisture percentage (75.63%). Many researchers have examined the ingredients of Kareish cheese. (Soliman *et al.,* 2004) found that cheese contains significant levels of moisture, protein, fat, and ash (68.97, 19.99, 3.87, and 1.81%). Metwalli (2011) gathered samples of Kareish cheese from Zagazig city and discovered that the standard standards were not met in terms of moisture content, coliform, yeast, or mold. Some values of the moisture and total solid content agree and others on contrary to those reported by Todaro *et al.,* (2013), El-Taweel *et al.*, (2017), Abd-Alla *et al.,* (2020), Abdeldaiem and Abouelwafa (2022) and Ismail *et al.* , (2024)

Titratable acidity:

The identical samples showed that there was a significant variation in acidity values between cheese samples from different centers, but not between samples from the same center. The acidity levels ranged from 0.42 to 1.98, in that order. The lowest acidity was recorded in Sohag city (0.42), while the highest acidity was recorded in Dar El-Salam city (1.98). These results align with the conclusions made by Awad *et al.,* (2015), Abo El-Makarem *et al.,* (2017), Abd-Alla *et al.,* (2020), Abdeldaiem and Abouelwafa (2022), Zain El-din *et al*., (2022) and Ismail *et al.,* (2024).

Fat content:

While there is no significant difference in the fat content of the Kareish cheese samples from the same center, there is a significant difference ($p<0.05$) in the samples from different centers. The fat levels of the Kareish cheese samples ranged from 2.30 to 4.46%, Additionally, the fat and dry matter levels of the Kareish cheese samples ranged from 8.06 to 13.86%, The lowest fat content was recorded in Sohag city (2.30), while the highest fat content was recorded in Girga city (4.46).These outcomes concur with the findings published by Todaro *et al.*,(2013), Abdeldaiem and

Abouelwafa (2022), Zain El-din *et al.* , (2022) and Ismail *et al.* , (2024).

Salt content:

Samples from the same center's Kareish cheese do not differ in terms of salt content; nevertheless, samples from various centers do differ significantly ($p<0.05$). Furthermore, Kareish cheese samples had salt contents ranging from 1.18 to 3.79%. The lowest salt content was recorded in Dar El-Salam city (1.18), while the highest fat content was recorded in Tima city (3.79). These results agree with those reported by Abo El-Makarem *et al.*, (2017), Abdeldaiemand and Abouelwafa (2022), Zain El-din *et al.*, (2022) and Ismail *et al.*, (2024).

Table (1). Moisture content, total solid, acidity, salt, fat, and fat/ dry matter of Kareish cheeses collected from the selected centers in Sohag governorate:

Collecting samples	Place	Moisture %	T. S%	Acidity %	Salt	Fat %	(F/D.M. %)
Sohag	1	74.69 ± 1.55	25.30±1.55	0.60± 0.15	1.46±0.03	2.46± 0.14	10.01 ±1.01
	2	74.31 ± 1.31	25.68±1.31	0.42± 0.06	1.38± 0.02	2.30±0.15	9.20± 1.06
	3	73.71 ± 1.30	26.28± 1.30	0.63±0.13	1.44±0.02	2.36± 0.12	9.06± 0.96
	4	75.63 ± 1.37	24.36±1.37	0.75±0.15	1.42± 0.40	2.56± 0.16	10.66± 1.17
	5	75.09 ± 1.29	24.91± 1.29	0.75± 0.14	1.46± 0.03	2.53±0.06	10.21± 0.67
	Mean	74.69 ± 0.54^{c}	25.30±0.54^{A}	0.63± 0.60^{A}	1.43±0.01^{A}	2.44± 0.05^{A}	9.83± 0.40^{B}
Dar Al Salam	1	73.41 ± 0.45	26.58±0.54	1.86±0.10	1.58± 0.07	3.46±0.03	13.02± 0.13
	2	73.26 ± 0.48	26.73± 0.48	1.80± 0.05	1.18± 0.07	3.50± 0.10	13.17± 0.59
	3	74.30 ± 0.49	25.69± 0.49	1.89± 0.05	1.24± 0.03	3.46±0.06	13.45± 0.36
	4	74.42 ± 0.25	25.58±0.25	1.98±0.05	1.39± 0.10	3.53± 0.12	13.86±0.53
	5	74.03 ± 0.68	25.97±0.68	1.92± 0.10	1.30± 0.10	3.53± 0.23	13.61± 1.25
	Mean	73.88 ± 0.22^{c}	26.11±0.22^{A}	1.89±0.03^{C}	1.34± 0.04^{A}	3.50± 0.04^{C}	13.42±0.27^{C}
Girga	1	57.01 ± 1.16	42.98± 1.16	1.32±0.07	2.64±0.07	4.30±0.00	10.04± 0.29
	2	58.62 ± 0.81	41.37± 0.81	1.26±0.05	2.56±0.03	4.30± 0.15	10.33± 0.41
	3	59.78 ± 0.84	40.21±0.84	1.29±0.06	2.64±0.07	4.26± 0.13	10.62± 0.43
	4	58.32 ± 1.66	41.68±1.68	1.29±0.10	2.66±0.03	4.46±0.03	10.75± 0.39
	5	57.76 ± 1.88	45.57± 1.68	1.38±0.03	2.58±0.08	4.36± 0.12	10.37±0.39
	Mean	58.30 ±0.56^{A}	42.36±0.69^{C}	1.30± 0.02^{B}	2.62±0.02^{B}	4.34± 0.04^{D}	10.42±0.16^{B}
Tima	1	70.51 ± 1.89	29.49± 1.89	0.78± 0.12	3.79±0.58	2.63±0.14	8.86±0.87
	2	69.46 ±1.90	30.53±1.90	0.63± 0.13	3.56± 0.55	2.60±0.00	8.50±o.55
	3	69.87 ± 1.17	30.13± 1.17	0.54±0.05	3.64±0.51	2.70±0.15	9.06± 0.64
	4	70.00 ± 1.01	30.00± 1.01	0.63± 0.13	3.66±0.54	2.63±0.14	8.77± 0.18
	5	69.69 ±1.94	31.32±1.94	0.78±0.07	3.21±0.64	2.53±0.17	8.06±0.39
	Mean	69.69 ±0.64^{B}	30.29±0.64^{B}	0.67± 0.04^{A}	3.57±0.22^{C}	2.62±0.05^{B}	8.65±0.23^{A}

Values with the same letter in each column are not-significant differences

Total nitrogen content:

The data in Table 2 showed that, regarding total nitrogen concentration, samples of Kareish cheese from the same center do not differ significantly; nevertheless, samples from other centers differ significantly ($p<0.05$). Additionally, the total nitrogen concentrations of the Kareish cheese samples ranged from 2.24 to 3.17, respectively. The lowest total nitrogen content was recorded in Sohag city (2.24), while the highest total nitrogen content was recorded in Tima city (3.17). These outcomes concur with the findings published by Zain El-din *et al*., (2022).

Total protein content:

The total protein content of samples of Kareish cheese from the same center does not differ from samples from different centers ($p<0.05$). Additionally, the total protein levels of the Kareish cheese samples ranged from 14.30 to 20.49, respectively. These outcomes concur with the findings published in terms of total protein and dry matter, samples of Kareish cheese from different centers do differ significantly ($p<0.05$), whereas samples from the same center do not differ significantly. Additionally, the total protein and dry matter levels of the Kareish cheese samples ranged from 38.87to 71.69. The lowest total protein content was recorded in Sohag city (14.30), while the highest total protein content was recorded in Tima city (20.49). These outcomes concur with the findings published by Ghada *et al.,* (2004), Todaro *et al.,* (2013) and Abdeldaiem and Abouelwafa (2022).

Soluble nitrogen content:

Samples from the same center's Kareish cheese do not differ in terms of soluble nitrogen nevertheless, samples from various centers do differ significantly ($p<0.05$). Furthermore, Kareish cheese samples had soluble nitrogen contents ranging from 0.19 to 0.46. The lowest soluble nitrogen content was recorded in Dar El-Salam city (0.19), while the highest soluble nitrogen content was recorded in Girga city (0.46). These results agree with those reported by Zain El-din *et al.,* (2022).

Table (2). Total nitrogen content, total protein, total protein/ dry matter, and soluble nitrogen of Kareish cheeses collected from the selected centers in Sohag governorate:

Collecting Samples	Place	T.N. %	T.P. %	T.P./D.M. %	S.N%
Sohag	1	2.26±0.04	14.47± 0.31	57.40±2.58	0.32±0.00
	2	2.26± 0.05	14.45±0.37	56.32± 1.38	0.34± 0.01
	3	2.28± 0.07	14.58±0.47	55.81± 1.38	0.35± 0.00
	4	2.24± 0.06	14.30± 0.38	58.60± 2.15	0.35± 0.00
	5	2.29±0.04	14.61± 0.29	58.78± 2.23	0.32± 0.01
	Mean	2.27 ± 0.02^{A}	14.48 ± 0.14^{A}	57.38 ± 0.82^{B}	0.33 ± 0.00^{B}
Dar Al Salam	1	2.93±0.11	18.73± 0.72	70.42± 3.20	0.20± 0.01
	2	2.83±0.09	18.09± 0.58	68.01± 1.24	0.19± 0.01
	3	2.72± 0.02	17.39± 0.17	67.48± 0.61	0.21± 0.00
	4	2.80± 0.10	17.86±0.67	69.71±2.39	0.20± 0.00
	5	2.93±0.12	18.69± 0.77	71.69± 2.42	0.19± 011
	Mean	2.84 ± 0.04^{C}	18.15 ± 0.27^{C}	69.46 ± 0.92^{C}	0.20 ± 0.00^{A}
Girga	1	2.61±0.03	16.69±0.20	39.02±1.41	0.44±0.02
	2	2.65±0.02	17.27±0.34	41.50±0.20	0.46±0.01
	3	2.62±0.06	16.75±0.40	41.66±0.27	0.42±0.02
	4	2.60±0.07	16.60±0.50	40.02±2.02	0.42±0.01
	5	2.56±0.06	16.35±0.40	38.87±1.65	0.42±0.03
	Mean	2.61 ± 0.02^{B}	16.73 ± 0.16^{B}	40.21 ± 0.59^{A}	0.43 ± 0.01^{D}
Tima	1	2.88±0.32	20.49±0.07	69..33±4.41	0.20± 0.02
	2	3.15±0.04	20.11±0.29	66.12±3.42	0.21±0.02
	3	3.14±0.04	20.05±0.27	67.35±2.84	0.23± 0.01
	4	3.17±0.07	20.13±0.14	67.42±3.41	0.20± 0.01
	5	2.91±0.30	20.49± 0.02	66.12±3.81	0.20±0.02
	Mean	3.05 ± 0.08^{D}	20.25 ± 0.11^{D}	67.27 ± 1.40^{C}	0.21 ± 0.00^{A}

Values with the same letter in each column are not-significant differences

Microbiological properties:

Total bacterial count (log cfu/g):

Data presented in Table 3 illustrate the Total bacterial counts of Kareish cheese collected from the selected centers in Sohag Governorate. In terms of total bacterial counts, samples of Kareish cheese from different centers do differ significantly ($p<0.05$), although samples from the same center do not differ significantly. Additionally, the total bacterial counts of the Kareish cheese samples ranged from 5.84 to 8.55. These outcomes concur with the findings published by Ibrahim *et al.,* (2015), Hassan and Gomaa (2016), Salem *et al.,* (2016), Ahmed *et al.,* (2018), Abd-Alla *et al., (*2020), Abdeldaiem and Abouelwafa (2022) and Ismail *et al.*, (2024).

Total *Escherichia coli* count (log cfu/g):

The *E. coli* count in Kareish cheese samples from the same center does not differ significantly from samples from various centers, as indicated by the data in Table 3 ($p<0.05$). Furthermore, *E. Coli* was found in every product and sample, with levels ranging from 2.38 to 5.47 log cfu/g. *E. Coli* is thought to be a microbiological biomarker of enteric pathogen presence and fecal contamination. These *E. coli* numbers are in violation of Egyptian regulations for Kareish cheese No. 4-1008/2005, which states that there should be no *E. coli* in kareish

cheese. These findings concur with Salem *et al.,* (2016), Abo El-Makarem *et al.,* (2017), Ahmed *et al.,* (2018), Abd-Alla *et al.,* (2020), Elbassiony *et al.,* (2021), Ahmed *et al.,* (2022), and Eid *et al.,* (2022)

Total *Salmonella* and *Shigella* count (log cfu/g):

Table 3 data ($p<0.05$) shows no significant difference in the number of Salmonella and Shigella in Kareish cheese samples from the same center compared to samples from different centers. Additionally, every product and sample included *Salmonella* and *Shigella* count, ranging in level from 2.45 to 3.38 log cfu/g. These results for kareish cheese agree with Ghada *et al.,* (2004) and Ibrahim *et al.,* (2015), and Abd-Alla *et al.,* (2020).

Total Yeasts and molds count (log cfu/g):

The counts of yeast and mold in cheese and other dairy products is used as a gauge for the level of good sanitation, and it is mostly to blame for the rancidity, softness, and color flaws that occur in soft, unripened cheese. The same samples demonstrated that, although there was no significant difference in the number of yeasts and molds between cheese samples from the same center, there was between samples from other centers. The range of the yeast and mold counts was 2.23 to 2.62. These findings support the conclusions drawn by Hassan and Gomaa (2016), Salem *et al.,* (2016), Ahmed *et al.,* (2018), Abd-Alla *et al., (*2020), Elbassiony *et al.,* (2021), Ahmed *et al.,* (2022), Eid *et al.,* (2022) and Ismail *et al.,* (2024).

Table (3). Microbiological counts (Log cfu/g) in Kareish cheese collected from the selected centers in Sohag Governorate:

Collecting samples	place	Total bacterial count	Total *Escherichia coli* count	Total *Salmonella* & *Shigella* count	*Molds* & *Yeasts*
Sohag	1	8.46±0.03	5.33±0.06	3.38±0.08	2.47±0.04
	2	8.40±0.02	5.26±0.10	3.37±0.07	2.41±0.03
	3	8.33±0.06	5.18±0.04	3.32±0.11	2.42±0.03
	4	8.37±0.09	5.21±0.06	3.29± 0.09	2.44±0.05
	5	8.39±0.09	5.33±0.06	3.25±0.09	2.46±0.04
	Mean	8.39 ± 0.02^{B}	5.26 ± 0.03^{C}	3.32 ± 0.03^{C}	2.44 ± 0.01^{B}
Dar Al Salam	1	7.11±1.40	5.05±0.06	2.80±0.09	2.29±0.08
	2	7.08±1.35	5.00±0.09	2.79±0.07	2.23±0.04
	3	7.18±1.27	5.03±0.11	2.74±0.11	2.34±0.09
	4	7.21±1.29	5.01±0.13	2.71±0.08	2.40±0.08
	5	5.84±1.36	5.11±0.09	2.68±0.08	2.38±0.13
	Mean	6.89 ± 0.52^{A}	5.04 ± 0.04^{B}	2.74 ± 0.03^{B}	2.33 ± 0.03^{A}
Girga	1	8.34±0.06	5.37±0.04	2.71±0.07	2.41±0.09
	2	8.41±0.08	5.45±0.04	2.69±0.07	2.36±0.06
	3	8.55±0.05	5.47±0.04	2.73± 0.06	2.45± 0.05
	4	8.51±0.08	5.44±0.06	2.71± 0.04	2.48±0.07
	5	8.41±0.10	5.38±0.04	2.64± 0.06	2.43±0.09
	Mean	8.44 ± 0.03^{B}	5.42 ± 0.02^{D}	2.69 ± 0.02^{B}	2.43 ± 0.03^{B}
Tima	1	7.26±0.11	2.44±0.11	2.49±0.07	2.59± 0.04
	2	7.22±0.11	2.43±0.12	2.45±0.08	2.54±0.07
	3	7.27±0.07	2.52±0.07	2.53±0.05	2.53±0.05
	4	7.22±0.06	2.46±0.03	2.49±0.02	2.54±0.06
	5	7.17±0.08	2.38±0.09	2.46±0.05	2.62±0.01
	Mean	7.23 ± 0.03^{A}	2.45 ± 0.03^{A}	2.48 ± 0.02^{A}	2.56 ± 0.02^{C}

Values with the same letter in each column are not-significant differences

CONCLUSION

According to the current investigation, harmful microorganisms were found in all collected samples and may be dangerous to the general public's health. Therefore, awareness campaigns about the use of heat treatments on milk and stringent hygienic practices for the production and handling of dairy products in rural Egypt are necessary for the manufacturing of dairy products in rural Egypt.

REFERENCES

Abd-Alla, A., Salman, K., and Mahmoud E. (2020). Microbiological quality of Kishk, Laban rayeb and Kareish cheese as rural products in Sohag governorate, Egypt. Egyptian J. Dairy Sci., 48: 65-72.

Abdeldaiem, A. M., & Abouelwafa, M. Y. (2022). Evaluation of dairy products quality collected from Ismailia and Sharkia Governorates, Egypt. Egyptian Journal of Dairy Science, (50)11-20.

Abo El-Makarem, H. S., Saber, A. S., and El Asuoty, M. S. (2017). Chemical and microbiological evaluation of some different soft cheese. *Assiut Vet. Med. J*, *63*(154): 10-19.

Ahmed, A. M., Ahmed, H. A., Mohran, M. A., & Mahmoud, N. E. H. H. (2018). A study of microbial quality of some rural dairy products in Assiut Governorate. *Assiut J. Agric. Sci*, *49*(4): 88-97.

Ahmed, A., Moustafa, M. K., Amin, W., and Sadek, O. (2022). Detection of some microorganisms of public health hazards in cheese. *Sohag Journal of junior Scientific Researchers*, 2, (3): 33 – 43.

AOAC. (1980). Official methods of analysis. 15th Ed., Association of Official Analytical Chemists, Benjamin Franklin Station, Washington, USA.

A.O.A.C. (2010). Association of Official Analytical Chemists. Official Methods of Analysis of Association of Official Agriculture Chemists. 17th Wisconsin: George Banta Co. Inc.

Awad, R. A., Salama, W. M. and Ragb, W. A. (2015). Enhancing yield and acceptability of Kareish cheese made of Reformulated milk. Annals of Agricultural Science. 60 (1): 87-93.

Cokal, Y., Dagdelen, A., Cenet, O. and Gunsen, U. (2012). Presence of *L. monocytogenes* and some bacterial pathogens in two Turkish traditional foods, Mihalic cheese and Hosmerim dessert. Food Control. 26: 337-340.

Deeb, M. M. A., Aman, I. M., and Ahmed, H. F. (2004). Bacteriological quality of Kareish cheese and trial to control Staphylococcus aureus in cheese. Alex. J. Vet. Sci, 21(2): 514-523.

Eid, R. F., Ahmed, A. A. H., Amin, W. F., & Amin, M. M. (2022). Microbiological evaluation of locally manufactured soft cheese. Assiut Veterinary Medical Journal, 68(174): 28-37.

Egyptian standards (ES: 1008-4/2005). Egyptian standard for soft cheese, part 4, Karish cheese. Egyptian Organization for Standardization and Quality. Arab Republic of Egypt

Elbassiony, T. A., ElKhawas, K. M., Mostafa, N. M., and Ewida, R. M. (2021). Microbiological Quality of Kareish cheeses. New Valley Veterinary Journal (NVVJ), 1, (1):16-22.

El-Taweel, H.S., El-Sisi, A.S. and Mailam, M. A. (2017). Improving functional properties of kareish cheese by adding low sodium salt and dried parsley. Egyptian Journal of Agriculture Research. 95 (3):1179-1191.

FDA (2002). Bacteriological Analytical Manual. 9th Ed., AOAC International, Arlington, VA, USA.

Ghada, Z. A. A., Alia, M. H., Soha, Al-S., Magdy, N. A., and Mohammed, F. S. (2004). Chemical, Nutritional and Microbiological Evaluation of Some Egyptian Soft Cheeses. The Egyptian Journal of Hospital Medicine. 17: 44- 57.

Hassan, G.M. and Gomaa, S.M. (2016). Microbiological quality of soft cheese marketed in Cairo and Giza Governorates. *Alex. J. Vet. Sci.*, 50(1): 18-23.

Hofi, M. A., H. M. Ali, Y. A. Heikal, and A. R. El-Beialy. 2004. Microstructure and rheological properties of ultrafiltrated Karish cheese made by direct acidification. Pages

419-443 in Proc. the 9th Egyptian Conf. for Dairy &Techn., Egypt.

ICMSF, (1996). International Committee of Microbiological Specification of Food, Microorganism in foods. Microbiological specification of food pathogens, 1st Ed. Black academic and professional, London, Pages 112-300.

Ibrahim, G. A., Sharaf, O. M., & El-Khalek, A. B. A. (2015). Microbiological quality of commercial raw milk, Domiati cheese and Kareish cheese. Middle East Journal of Applied Sciences, *5*(1): 171-176.

Ismail, H. A., Mohamed, A. G., Bakry, A. M., Saad, M. M., & Abouelnaga, M. I. (2024). Quality Assessment of Chemical and Microbiological Characteristics of Cow's Milk and Some Dairy Products in the New Valley Governorate. New Valley Journal of Agricultural Science, 4(1): 33-45.

James, G. C., and Natalie, S. (2002). Microbiology; A laboratory manual. Part II. 6th Ed. Benjman Cummings, N. Y.

Khalifa1, E. and Nossair, M. (2016). Comparative Mycological Assay on Prevalence of Yeasts, Molds, and Aflatoxin M1 (AFM1) in Some Fermented Milk Products in Alexandria, Egypt. Life Science Journal13 (7): 20.

Marshall, R.T. (2004). American Public Health Association.
Standard methods for the examination of dairy products, 17th ed Washington, DC., USA

Metwalli, S.A. (2011). Extended shelf life of kareish cheese by natural preservatives. Egyptian J. of Agric. Res., 89(2): 639-649.

Salem, H.; El-Attar, L. and Omran, E. (2016). Microbiological assessment of some parameters of Kariesh cheese sold by supermarkets and street vendors in Alexandria, Egypt. J. of High Institute of Public Health, *46*(2): 77-85.

SAS. (2008). Statistical Analysis System, Version 9.2. Cary, USA: SAS Institute Inc.

Soliman, G., Al-S, S., NA, M., and FS, M. (2004). Chemical, nutritional and microbiological evaluation of some Egyptian soft cheeses. The Egyptian Journal of Hospital Medicine, *17*(1): 44-57.

Steel, R.G.D. and Torrie, J.H. (1980). Principles and
Procedures of Statistics. New York, NY. McGrawHill Book Co., Inc.

Todaro, A., Adly, F. A. and Omar, O. A. H. (2013). History, Processing, and quality enhancement of traditional Egyptian Kariesh cheese. Journal of Food Science and Technology. 1(1)1-6.

Zain El-din, A. H., El-Rahim, A., Ali, M., El-Gazzar, F. E., Osman, D. M., & Mahmoud, G. A. (2022). Mycoflora of Some Cheese Types in Assiut City, Egypt. Assiut Journal of Agricultural Sciences, 53(5): 13-23.