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Microbiological studies on some soft cheeses in Taiz city

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ABSTRACT

This investigation aims to study the effect of different storage temeratures on the microorganisms and keeping quality of local and imported soft cheeses. The samples were taken from different markets in Taiz City, Republic of Yemen. Both local and imported soft cheeses samples were stored at 28, 10 and 4°C. The samples stored at 28°C were used as control samples. Microbiological changes were followed by examination of samples during storage at zero time and weekly (every 7 days) for a period of 60 days until signs of spoilage appeared. The results indicated that cold storage at 10°C reduced the contamination for the Aerobic, Anaerobic, Spore formers, Lactic acid bacteria, Coliform group, *Salmonella* spp, *Staphylococcus* spp, *Streptococcus* spp, *Bacillus* spp, *Clostridium* spp, *Enterococci* spp, Proteolytic bacteria, Psychrophilic bacteria and Yeast and Moulds counts by the following percentages: 47.63 and 50.10%, 31.66 and 36.50%, 28.32 and 24.84%, 33.33 and 33.89%, 35.44and 33.80%, 36.76 and 37.80%, 42.50 and 42.50%, 37.06 and 34.39%, 33.90 and 34.92%, 34.95 and 38.87%, 38.73 and 39.64%, 57.55 and 50.76%, 33.07 and 30.37% and 45.61 and 47.37% of local and imported soft cheeses respectively as compared with their control samples.. Also the cold storage at 4 °C induced a reduction by the following percentages:52.16 and 53.75%, 33.33 and 39.18%, 38.22 and 34.74%, 39.96 and 49.32%, 38.23 and 42.00%, 41.10 and 42.95%, 45.60 and 50.00%,38.98 and 36.24%, 36.87 and 37.66%, 36.1 and 46.83%, 46.60 and 59.13%, 59.95 and 66.00%, 42.51% and 43.45% and 62.71 and 63.43 %for the mentioned microbes and samples, respectively as compared with their control samples. However, the shelf-life were increased by 21and 37 days when using a cold storage at 10 °C and extended by 30 and 60 days when using a cold storage at 4 °C of local and imported soft cheeses, respectively as compared with their control samples. As well as the isolation and classification of (65) bacterial isolates from the above samples, those bacteria identified as (27) of *Bacillus* spp, and (38) of *Lactic acid* spp, both species divided into five groups.

Keywords: Soft cheeses, Storage, Taiz City, Microbes, Contamination.

INTRODUCTION

Cheese is known to be of great nutritional value for human consumption as its fats and protein have a high biological value and contains all essential fatty and amino acids also it is a source of vitamins and minerals. However, most cheeses become spoiled, as a result of contamination by microorganisms, moulds and yeasts (**Abd-Elaty, 1994 and Dalloul, 2000**).Taiz cheese is not well known in the Arab countries, it is the only kind of cheese known in Yemen, it is commonly known as Taiz cheese. It is very old Cheese as observed from its old method of manufacture. Taiz cheese is originally made from raw sheep's, goat's, cow's and camel's milk or mixture of these milks (**Dalloul1, 987 and Shaiban, 2000**). Taiz cheese has many kinds (fresh, soft, dry, half dry, smoked and un-smoked, with and without salt). The coagulation substances are derived from stomach contents of suckling goats. No enough studies were performed before on this type of Cheese (**El-Shamery, 2007**). Therefore the present study aimed to evaluate the microbiological contamination of local and imported soft cheeses (without salt) in retail markets. The effect of storage temperatures on the micro flora and the keeping quality of the collected cheese samples stored at 28, 10 and 4°C for 60 days was also studied.

MATERIALS AND METHODS

Materials

A total of seventy four samples of local and imported soft cheeses (without salt) were randomly collected from different cheese shops of traditional markets in Taiz City (Republic of Yemen). Both local and imported soft cheeses samples were directly stored at (28, 10 and 4°C) for 60 days. Samples stored at 28°C were used as control samples. Samples were tested upon arrival to the laboratory or kept refrigerated overnight prior to analyses at zero time and weekly (7 days) during storage until signs of spoilage appeared on samples (10^6-10^7c.f.u/g). These samples were rejected as compared with the microbiological criteria for Arabia and Egyptian Standard (**Ozdemir *et al*., 2010, Nespolo and Brandelli, 2011 and Robinsen, 2012).**

Methods

Each 25g sub-sample (in triplicates) was homogenized with 225 ml peptone water (0.1% sterile) in a warring blender. Diluted samples were further prepared for microbiological test (**APHA 1999**) todeterminea colony forming u,nit were calculated and recorded as c.f.u/g Cheese. **Aerobic** bacterial count was examined according to **APHA (1999) and Difco (1994)**, using Tryptone glucose extract agar medium. Cheese samples was diluted, inoculated into plates and incubated at 32°Cfor 2-3 days. **Anaerobic** bacterial count used Perfingens agar (O.P.S.P) medium, make up the medium according to **Oxoide (1995) and APHA (1999)** prepare pour plates containing approximately 25ml per plate, using 1ml aliquots of suitable series of dilution of homogenized test sample, mix well before setting incubate the plates at 37°Cfor 18-24 h withH_2 / Co_2gas generating kit pack br 38 in conventional gas-jar. **Spore formers** determined according to **APHA (1999)** using Dextrose trap tone agar medium and incubated for 48h at 55°C. **Coli form group**, determined according to **Blood and Curtis (1995),** using Violet red bile agar medium (**APHA, 1999)**. **Lactic acid** bacteria were counted in APT(BBL,U.S.A) agar medium **(Difco, 1994)**, plates incubated under anaerobic condition (candle jars, 32°C) for 48 h. according to **APHA (1999).*****Salmonella*** **spp**, determined according to **APHA(1999),** using Brilliant green agar medium incubated for 18-24 h, at 37°C. ***Staphylococcus*** **spp.** isolation aliquots (0.1 ml) were surface spread on Baird parker agar with Egg-yolk telluride enrichment (**Difco, 1994).** ***Streptococcus*** **spp,** using dried Brain heart infusion agar medium and MaCconky agar medium (**Oxoide1995**), the inoculums was spreader on the surface of plate, after incubation at 37°C for 24-48 h, the blue colonies, surrounded by clear zone were counted according to **APHA (1999)**. ***Bacillus*** **spp**, Tryptone soya agar and Manitol-egg yolk-polymyxin (MYP) agar media as described by **Holobrook and Anderson (1990).** The plates incubated for 16-24 h,at 37°C. Confirmation tests of suspected colonies were carried-out biochemically by testing acid from different sugars. Colonies ferment glucose but not Manito l, xylose or Arbinose were considered to be *Bacillus* spp. ***Clostridium*** **spp**, about 1-2 g of samples were inoculated into test tube containing 15 ml of fluid Thioglycollatebroth and then incubated at 46 °C for 4-6 h, one ml of the positive tubes which showed turbidity and gas production were plated using Cooked meat agar medium asdiscribed by **Craven *et al.* (1995).** The tubes were incubated at 37 °C for 24 h, in anaerobic system (**Oxoide, 1995**), black colonies were isolated and inoculated into Lactose gelatin medium incubated at 37 °C for 24-48 h, then cooled in refrigerator (5 °C), positive colonies are characterized by the ability to liquefy gelatin after 24-44 h (**Hauschild and Hilsfhimer, 1994).** ***Enterococci*** **spp**, using dried Kanamycin esculenazide agar medium as recommended by **Mossel and Tamminge (1990)**, as a selective medium for the detection and enumeration of Lance field group Streptococci, Positive colonies were confirmed by microscopic examination for the presence of short-chained Streptococci. **Proteolytic** bacteria were done on Nutrient agar to which 10% (10 ml/l00ml medium) of sterile skim-milk has been added just before pouring, and incubated for 48-72 h, at 30 °C. Caseolytic colonies were detected by clear zones around the colonies and confirmed by flooding the plates with 1% tannic acid (**APHA, 1999**). **Psychotrophic** bacteria were enumerated on plate count agar medium and incubated at5^{o}C for 7-10 days as recommended by **APHA (1999**). **Yeast and Mould** were enumerated in acidified (pH4.5) Potato dextrose agar (**Difco, 1994**) incubated at 25^{o}Cfor 5 to 7 days.

Isolation and identification of *Bacillus*sppand *Lactic acid* sppbacteria:

Diluted samples (1:10) were streaked or surface spread onto agar plates of Rogosa SL (**Difco, 1994**) and APT for enumeration of lactobacilli and other LAB, respectively. Spread plates of ALSAN medium (**AL-Zoreky and Sandine, 1991**) were incubatedanaerobically at 32°C for 72 h, used for selective isolation of *Leuconostoc* spp, from samples. Asporogeneousgram positive (Cocci or Rods) and catalos negative colonies (up to 5 per plate) were considered as presumptive LAB. Identified colonies were further purified on APT agar. Isolates were examined (**Sneath *et al.*, 1996**) for cell morphology, Gram and catalase reactions, gas production from glucose, growth at 15 °C and 45°C and dextrin formation from sucrose. *Streptococcus* sppwere separated by growth at 45°C in 6.5% NaCl broths and hydrolysis of arginineand esculin. Reduction of both litmus milk and 0.1% methylene blue milk, growth at 40 ^{o}C, and growth in 4% NaCl broths were used for species identification of *Lactobacillus*(group N streptococci) (**APHA, 1999**). *Pediococcus* spp. Was identified by morphology, growth in litmus milk (plus glucose and yeast extract), growth at elevated temperatures (40 and 50^{o}C) and initiation of growth in 6.5% NaCl broths (**Bergey's Manual for Systematic Bacteriology, 1996**). Isolation and identification of *Bacillus* spp, were made from total count plates (**APHA 1999**), colonies in opposite sectors, were picked and transferred to agar slants of the same medium, after purification of bacterial grouping according to morphological and biochemical characteristics and Gram stain was carried out, the bacterial groups were identified to generic and species level on the basis of biochemical and morphological characteristics with the aid of **Bergey's Manual for Systematic Bacteriology (1996), Kotze kidou (1996) and Bergey's Manual of Determinative Bacteriology (1999)**, the method of identification adopted for this purpose, genus *Bacillus*, with standard tests and classification schemes described by **Smith *et al*. (1952)** in conjunction and examination were carried out according to **Holt *et al*. (1996).**

RESULTS AND DISCUSSION

The quality and shelf- life of cheese are largely dependent on their microbial load, storage temperature, transportation. Any technological treatment which can be effectively used to eliminate the pathogenic microorganisms which is required processing for improving the hygienic quality of the final product. Application of cold storage techniques has been successfully used to overcome spoilage and extending the shelf-life of cheese during transportation in markets.

Effect of cold storage on Aerobic and Anaerobic bacterial counts :

The results in table (1) show the effect of different kind of storage on Aerobic and Anaerobic bacterial count/g of local and imported soft cheese. From this table it could be seem that the initial Aerobic and Anaerobic bacterial counts of control samples at(28^{o}C, 10^{o}C and 4 ^{o}C) at zero time and before storage were $3.0x10^{3}$, $1.0x10^{3}$, $1.5x10^{3}$, $1.6x10^{3}$, $1.1x10^{2}$and $2.2x10^{2}$c.f.u/g for Aerobic, and $2.9x10^{2}$,$5.8x10^{2}$,$9.0x10^{2}$,$1.0 x10^{2}$, $2.1 x10^{2}$ and $2.2 x10^{2}$c.f.u/g for Anaerobic bacterial count of local and imported soft cheese samples. This values are with in the range of values of local and imported soft cheese, as reported by **Shaiban (1990), El-Baradie *et al*. (2005), El-Gendy *et al*. (2009), Ozdemir *et al*. (2010) and Robinsen (2012)**. The same table (1) indicates that during storage, gradual increase in the total Aerobic and Anaerobic bacterial counts were observed reaching to $9.4x10^{7}$, $8.8x10^{6}$, $7.7x10^{6}$, $1.0x10^{7}$, $2.1x10^{6}$ and $1.2x10^{7}$ c.f.u/g for Aerobic and $1.0x10^{5}$, $1.1x10^{5}$, $4.0x10^{5}$, $2.0x10^{5}$, $5.9x10^{5}$ and $8.2x10^{5}$ c.f.u/g for Anaerobic bacterial counts of local and imported soft cheese samples after 7,21, 30, 14, 37 and 60 days of storage, respectively. However, the data of table (1) show that the total Aerobic bacterial count were rejected after 7,21,30,14, 37and 60 days of storage at 28,10 and 4^{0}C for local and imported soft cheese samples respectively, at this stage the control sample of Aerobic bacterial count were completely rejected by the Border line of local and imported soft cheeses. Acceptability for total Aerobic bacterial count was found to be ($\geq 10^6$) c.f.u/g and appearance of putrid smell as reported by **Iso (1999), AL-Zoreky (2000), Ali (2010) and Nespolo and Brandelli (2011).** During subsequent cold storage at 10 and 4°C, the Aerobic and Anaerobic bacterial count of local and imported soft cheese samples had increased with storage time increasing. This might be due to that post flora were less metabolically active under high cold conditions. The obtained results agree with the results of **Aly *et al*. (1990), Shaker *et al*.(2004) and Ali (2010).** This increasing during storage in the total bacterial counts were expected as the cheese is considered as one of the most perishable foods which highly susceptible to microbial invasion. Application of cold storage led to reduction in the microorganisms of treated samples, immediately after thecold process. In other words, it is means that reduction of Aerobic bacterial counts percentages of local and imported soft cheese samples were 46.63 and50.10% at 10°C of storage and 52.06and53.44% at 4°C of storage for the above mentioned microbes and samples, respectively comparing with their control samples. While the Anaerobic bacterial counts percentages were 30.66 and 35.0% at 10°C cold storage and 33.33and39.16 % at 4°C cold storage for the above mentioned microbes of local and imported soft cheese samples, respectively. The reduction in the bacterial load is mainly due to the direct and indirect effects of cold storage (low temperature) on microorganisms in accordance with **Aly *et al*. (1990), Shaiban (2000), Dalloul (2000), Hussein *et al.* 2005), Ozdemir *et al*. (2010) and Shehata and El-Magthop (2012).** This indicate the importance of cold storage in extending the shelf-life of refrigerated samples to 21,30, 37 and 60 days by using a cold storage at 10°C and 4°C of local and imported soft cheese samples, respectively as compared with their control sample at (28°C) after 7 and 14 days of storage. These results emphasized the finding of **Galloway (1995), AL-Zoreky (2000), Hussein *et al*. (2005) and El-Gendy*et al*. (2009), Ozdemir *et al*. (2010) and Shehata and El-Magthop (2012).**

<u>Effect of coldstorage on Spore form and Lactic acid bacterial counts:</u>

Data presented in table (2) show that the count of spore forming and lactic acid bacteria of local and imported soft cheese samples as affected by cold and subsequent storage at 28,10 and 4°C. The results indicated that spore forming bacteria were the most resist types to cold storage these agree with **El-Sayed *et al*. (1996), Te-Giffel *et al.* (1999), Abou-Dowood *at al*.(2005) and kousta *at al*.(2010).** During storage, their total numbers increased at relatively slow rate showing 1.0x10, 2.8x10^2, 1.1x10, 3.2x10^2, 1.0x10, 1.9x10^2, 6.0, 2.0x10^1, 8.0, 1.8x10^1, 5.5, and , 3.0x10^1 c.f.u/g at the beginning of storage and reached to 6.0x10^1, 1.0x10^5, 9.0x10^1, 9.8x10^3, 9.8x10^1, 9.9x10^3, 4.0x10^1, 8.2x10^4, 1.0x10^1, 7.2x10^2, 1.4x10^1 and 5.1x10^3 c.f.u/g after 7, 14, 21, 30, 37 and 60 days of storage at 28, 10 and 4°C for spore former and lactic acid bacteria counts of local and imported soft cheese samples, respectively. Application of cold storage led to reduction in the counts of microorganisms of treated samples, immediately after the cold process. In other words, it means that reduction of Spore formers bacterial counts percent of local and imported soft cheese samples were 28.31 and 24.98% at 10°C of storage and 38.06 and 34.66 % at 4°C of storage for the above mentioned microbes and samples, respectively comparing with their control samples. While the lactic acid bacterial counts percentages were 33.33 and 33.12 % at 10°C cold storage and 39.96 and 49.16 % at 4°C cold storage of local and imported soft cheese samples, respectively. The reduction in bacterial load and extending shelf-life in cold storage samples are due to the effect of cold storage which agree with **Al-Zoreky and Sandine (1991), Tzanetakis and Litop (1992), Tzanetakis *et al*. (1997), Te–Giffel *et al.* (1999), Ali (2010) and Nespolo and Brandelli (2011).**

<u>Effect of cold storage on Coli form group and *Salmonella* spp counts:</u>

Effect of cold storage on Coli form group and *Salmonella* spp bacterial counts presented in table (3). That cold storage sharply decreased the viable count for coli form group and *Salmonella* spp from 1.1x10 , 4.8, 1.0x10 and 2.8c.f.u/g for control samples (at 28^{o}C)to 4.7, 2.7, 4.4, 2.5, 4.6, 1.9, 3.8 and 1.8c.f.u/g of both local and imported soft cheese at 10 ^{o}C, and 4^{o}Cafter 7 and 14 days of cold storage respectively.. On the other hand, the reduction in percentages were 35.44 and 33.8% at 10^{o}C and 38.22and 42.00% at 4^{o}C cold storage of local and imported soft cheese samples for Coli form group, respectively. While, the *Salmonella* spp counts percentages were 36.65 and 37.63 % at 10^{o}C and 41.56 and 42.86 % at 4^{o}C cold storage of local and imported soft cheese samples, respectively, comparing with their control samples. However the counts of the above mentioned microbes increased during cold storage at 10 and 4^{o}C by a small rate after the first period of storage till rejected after 7, 21, 14, 30, 37and 60 days of cold storage respectively.The reduction and extending of shelf-life are due to the effect of low temperature of cold storage. These results are similar with that recorded by **Boold and Curtis (1995), El-Sayed *et al*. (1996), Kaloyanov and Gogov (1997), Abou-Dawood *et a.l.* (2005), El-Shamery (2007), Ozdemir *et al*. (2010) and Robinsen (2012)**.

<u>Effect of cold storage on *Staphylococcus* spp and *Streptococcus* spp counts:</u>

Data presented in table (4) show that the effect of different kind of storage on *Staphylococcus* spp and *Streptococcus* spp count/g for local and imported soft cheese. Cold storage sharply decreased the viable count of *Staphylococcus* and *Streptococcus* counts, from 1.0 x10^3 and 3.0x10^{4}c.f.u/g for control of local soft cheese samples at 28^{o}C to 2.0x10^1, 2.8x10^2, 1.5x10^1 and 2.2 x10^{2}c.f.u/g at 10 and 4^{o}C after 7 days of cold storage, respectively. Also the counts of imported soft cheese samples were decreased from 1.0x10^3 and 2.0x10^{4}c.f.u/g for control samples at 28^{o}C to 2.0x10^1, 3.0x10^2 9.9x10 and 2.4x10^2 c.f.u/g at 10 and 4^{o}C after 14 days of cold storage, respectively. On the other hands, the reduction in percentages of *Staphylococcus* spp of local and imported soft cheese samples were 42.5 ,42.47, 45.60 and 50.00% at 10^{o}C and 4^{o}C, respectively and 36.98 , 34.39 , 38.97 and 36.22 % of *Streptococcus* spp at 10^{o}C and 4^{o}C cold storage of local and imported soft cheese samples, respectively comparing with their control samples. This reduction and extending of shelf-life may be due to effect of low temperature of storage. These results are similar with **Abou-Dawood *et al*. (2005), El-Shamery (2007) and kousta *at al*. (2010).** However, their counts increased during storage at 28, 10 and 4^{o}C by a small rate after the first period of storage till rejected after 7, 21, 30, 14, 37and 60 days of storage which agree with that recorded by **Boold and Curtis (1995), El-Sayed *et al*. (1996) and El-Baradie *et al.* (2005)**.

<u>Effect of cold storage on *Bacillus*spp and*Clostridium*sppcounts:</u>

Data presented in table (5) show that the count of *Bacillus* and *Clostridium.* Spp of local and imported soft cheese samples as affected by cold storage at 28,10and 4^{o}C. The results indicated that *Bacillus* and *Clostridium* spp were the most resist types to cold storage which were in harmony with the results postulated by **El-Sayed *et al.*(1996),Te-Giffel *et al.* (1999), Abou-Dowood *at al.*(2005), Farzana *et al.* (2009), Ozdemir *et al*. (2010) and Shehata and El-Magthop (2012).** During storage, their total numbers increased at relatively slow rate showing 2.0x10, 1.8x10, 3.0x10, 9.4, 6.9, 8.6 c.f.u/g for *Bacillus* spp, and 9.9,8.8, 7.9, 9.4,6.9 and 8.6 c.f.u/g for *Clostridium* spp count at the beginning of storage, respectively and reached to 4.9x10^1,4.0x10^1, 5.1x10^1, 3.0x10^1, 1.9x10^1, 3.5x10^{1}c.f.u/g of *Bacillus* spp and1.0x10^1, 9.0x10^1, 9.5x10^1, 6.0x10^1, 7.9 x10^1 and 1.5x10^2 c.f.u/g of *Clostridium* spp of both types after 7, 14, 21,30,37and 60 days of storage at 28, 10 and 4°C, respectively. The results in table (5) indicated that cold storage extending shelf-life and sharply slowly decreased the viable count of the corresponding microorganisms in the tested sample. On the other hand the reduction in percentageswere 33. 89, 34.70, 36.84 and 37.66 % of *Bacillus* spp and 34.94, 38.66, 38.22 and 42.00 of *Clostridium* spp in both cheeses at 10^{o}C and 4^{o}C cold storage, respectively, comparing with their control samples. The reduction in bacterial load and extending of bacterial shelf-life in cold storage samples may be due to the effect of cold storage which agrees with **Tzanetakis and Litop (1992), Te–Giff el *et al*. (1999), Dalloul (2000), El-Baradie *et al.* (2005), El-Shamery (2007), Kousta *at al*. (2010) and Nespolo and Brandelli (2011**).

Effect of cold storage on*Enterococci* spp and Proteolytic bacterial counts:

The results in table (6) show the effect of different kind of storage on *Enterococci* spp and proteolyticbacterial count/g of local and imported soft cheese**.** It could be seem that the initial bacterial counts on zero time before storage were8.7**,** 1.0x10, 7.9, 9.9, 9.1, 1.0x10, 9.4, 9.0, 8.9, 6.9, 9.1 and 8.6c.f.u/gof the above mentioned samples and microbes respectively. During subsequent cold storage at 10 and 4^{o}C, the *Enterococci* spp and proteolytic bacterial count of local and imported soft cheese samples had increased as storage time increased, but with different rates, the higher storage temperature, the higher was the rate of increase. This might be due to that post flora war less metabolic activity of post flora under high cold conditions. They reached to 1.0x10^{2},1.0x10^{3}, 1.1x10^{1},9.1x10^{1},2.5x10^{1} and 4.5x10^{1}c.f.u/g after 7, 21 and 30 days of storage at (28,10 and 4^{o}C)of local soft cheese, respectively. While, the counts of imported soft cheese samples reached to 2.8x10^{1}, 1.0x10^{2}, 7.9x10^{1}, 2.9x10^{1}, 9.5x10^{1} and 1.0x10^{2}c.f.u/g after 14,37 and 60 days of storage at (28,10 and 4^{o}C) of the above mentioned microbes, respectively. The obtained results are in agreement with that recorded by **Dalloul (2000), El-Shamery (2001), El-Baradie *et al.* (2005), Abou-Dawood *et al*. (2005) and El-Shamery (2007)**. Application of cold storage led to reduction in the microorganism of treated samples, after storage at low temperature, they reached to 6.9x10, 5.0x10, 4.0x10 and 4.0x10 c.f.u/g after 7days of storage at (28, 10 and 4^{o}C) of local soft cheese, respectively. While in imported soft cheese samples these counts reached to3.0x10, 3.0x10, 1.0x10 and 1.0x10c.f.u/g after 14days of storage at (28,10 and4^{o}C), respectively The reduction of *Enterococci* spp counts were 38.73and 39.64% at 10^{o}C of storage and 46.60 and 59.13% at 4^{o}C of storage for local and imported soft cheese samples, respectively comparing with their control samples. While, the proteolyticcounts percentages were 57.55 and 50.76% at 10^{o}C of storage and59.95and 66.66% at 4^{o}C of storage for local and imported soft cheese samples, respectively. These results agree with that recorded by **El-Shamery (2007)**, **Gomah (2008), Ozdemir *et al*. (2010) and Shehata and El-Magthop (2012).**

Effect of storage on Yeast and Moulds and Psychrophilic counts:

Date illustrated in table (7) show the effect of different temperatures storage (28, 10 and 4^{o}C) on psychrophilic bacteria and yeast and moulds counts of local and imported soft cheese, the results indicate that cold storage are effective in reducing the viable counts, decrease percent counts for yeast and moulds of local and imported soft cheese about 45.61% and 47.37 % at 10^{o}C and 62.71 and 63.89% at 4^{o}C after 7 and 14 days of storage, respectively comparing with their control samples. While, the decrease percentage counts of viable psychrophilic count, about32.07 and 30.37% at 10^{o}C and 42.51 and 43.45% at 4^{o}C after 7 and 14 days of storage for local and imported soft cheese samples comparing with their control samples respectively. Thisextending of shelf-lifemainly due to effect of cold storage. These results agree with **Aly *et al.* (1990), Abd-Elaty (1994), El-Shamery (2001), El-Baradie *et al.* (2005), Farzana *et al.* (2009), Ozdemir *et al*. (2010) and Robinsen (2012)**. During subsequent cold storage at 10 and 4^{o}C, both the above mentioned microbes count of local and imported soft cheese samples had increased with storage time increasing, but with different rates, the higher storage temperature , the higher rate of storage the higher rate of increase. This might be due to less metabolic activity of post flora under high cold conditions. Data presented in table (7) show that the total number of Psychrophilic bacterial and Yeast and Moulds counts were 1.2x10, 9.2, 2.0x10, 8.9, 2.1x10, 9.7, 9.4, 8.4, 9.0, 5.9, 8.7 and 7.6 c.f.u/g on zero time and reaching 4.0 x10^{2}, 9.0 x10^{1}, 1.2x10^{2}, 6.1x10^{2}, 6.0x10^{2}, 7.5x10^{2}, 6.0x10^{1}, 2.0x10^{1}, 2.2x10^{1}, 8.9x10^{2}, 1.2x10^{2} and 9.9 x10^{2} c.f.u/g after 7, 14, 21, 30, 37 and 60 day sat 28, 10 and 4^{o}C end of storage for local and imported soft cheese samples for both above mentioned microbes, respectively. These results are in harmony with **Pitt and Hocking (1995), El-Shamery (2001), Hussin *et al*. (2005), El-Shamery (2007), Giffel *et al*. (2008), Ali (2010) and Nespolo and Brandelli (2011).**

Isolation and identification of bacterial isolates:

The results in tables (8, 9) described the numbers, the percent, and difference between the numbers and percent of *Bacillus* spp and *Lactic acid* bacterial species isolated from control of local and imported soft cheese. The data in table (8) illustrate twenty seven bacterial isolates of above sample; these bacterial isolates are divided into five groups classified as following of *Bacillus* species. Group one contains nine species identified as *Bacillussubtillus*, represented about 33.33 % of the total isolates for both culture studies, five of them obtained from local soft cheese and four of them from imported soft cheese samples. Group two contains five species identifiedas *Bacilluspumilus* three of them are present in local soft cheese by percentage (20 %) and two from imported soft cheese samples by percentage (16.66 %) of the total isolated culture. Group three contains four species of *Bacilluscirculans*, two of them obtained from local soft cheese and two from imported soft cheese samples by percentage (13.33%-16.66%) of local and imported soft cheese samples, respectively. Group four contains seven species identified as *Bacilluslentus*, four of them represented about (26.66 %) in local soft cheese samples and anther are three species of *Bacilluslentus* present by percentage (25 %) in imported soft cheese samples. Group five contains two species identified as *Bacillusmecerans* once of them obtained from local soft cheese by percentage (6.66 %) and anther represented about (8.33 %) of the total isolated local and imported soft cheese culture. Also the table (9) showed the 38 species of *lactic acid* spp isolated from the same above samples, this species divided to five groups classified as following: The group one contains twenty three (23) species identified as *Streptococcus* spp, fourteen (14) of them are present in local soft cheese by percentage (58.33%) and nine (9) of them are present from imported soft cheese samples by percentage (64.28 %) of the total isolated culture. Group two as *Bifido-bacterium* spp, the number of them eight (8) species five of them obtained from local soft cheese and three from imported soft cheese samples by percentage (20.83 and 21.42 %), respectively. Group three have one species only identified as *Leuconostoc* spp obtained from local soft cheese samples and no viable count of them in imported soft cheese samples. Group four are *Pediococcus* spp the numbers of them five species three in local soft cheese and two in imported soft cheese samples by percentage (12.5% and 14.28%) respectively. Group five contain one species only obtained from local soft cheese and none appear in imported soft cheese samples, it identified as *Lactobacillus* spp. From the same tables (8 and9) the groups (1-2-4) of *Bacillus* spp, at (Table 8) and the groups (1-2-4) of *Lactic acid* spp, at (Table 9) were the main flora, and groups (3-4) of *Bacillus* spp, at (Table 8) the(3- 4) groups of *Lactic acid* spp, at (Table 9) were smaller flora in control local and imported soft cheese comparing with total isolates. Also it be noticed no clear difference between number of isolates of *Bacillus* spp or *lactic acid* spp flora for local and imported soft cheese samples except that group one of *Lactic acid.* spp (Table,9). These results seemed to be the *Bacillus* spp and some of *lactic acid* spp were more resistant organisms for temperature of cooling or may be due to contaminants the samples from dust, air, soil, water and animal during currency of cheeses. All these results were in agreement with the results of **Al-Zoreky and Sandine (1991), Te-Giffel *et al*. (1999), Al-Zoreky (2000), Shaiban (2000), Shaker *et al*. (2004), El-Baradie *et al.* (2005), El-Shamery(2007), Farzana *et al.* (2009) and Ozdemir *et al*. (2010).**

CONCLUSION

From the mentioned results it could be concluded that:

1- Microbiological evaluation of samples at zero time was in agreement with the microbiological criteria for Arabia and Egyptian Standard Foods.

2- Cold storage at (10 and 4^{o}C) reduced the microbial contamination density in all samples; the reduction had go with the cold temperature degree increasing, the higher cold temperature degree, the greater reduction of bacterial load.

3- The cold temperature degree at 4^{o}C is reduced all microbial contamination density with pathogenic microorganisms, and increased the shelf-life of samples more than anther samples that stored at 28 and 10^{o}C.

4- The microbial density of all samples (untreated like control and treated with cold storage like cooling samples) increasing during storage, it increased with increasing time of storage, the increasing in control samples is higher than treated samples. Therefore, the microbial count decreased with increasing the temperature degree of cold storage the higher temperature degree, the greater reduction of bacterial load on all samples under investigation compared with control samples.

Table 1: Effect of storage temperature on Aerobic and Anaerobic bacteria, count /g of local and imported soft Taiz cheeses

Kind of cheese	**Local soft cheese**						**Imported soft cheese**					
Temperature of storage	**Room temperature at 28^{O} C**		**Cold temperature at 10 ^{O}C**		**Cold temperature at 4^{O}C**		**Room temperature at 28^{O} C**		**Cold temperature at 10 ^{O}C**		**Cold temperature at 4^{O}C**	
Time of storage in days	**A**	**AN**	**A**	**AN**	**A**	**AN**	**A**	**AN**	**A**	**AN**	**A**	**AN**
0	$3.0x10^{3}$	$2.9x10^{2}$	$1.0x10^{3}$	$5.8x10^{2}$	$1.5x10^{3}$	$9.0x10^{2}$	$1.6x10^{3}$	$1.0\ x10^{2}$	$1.1x10^{2}$	$2.1x10^{2}$	$2.2x10^{2}$	$2.2x10^{2}$
7	$9.4x10^{7}$	$1.0x10^{5}$	$6.1x10^{3}$	$1.4x10^{3}$	$2.0x10^{3}$	$1.0x10^{3}$	$3.1\ x10^{4}$	$3.9\ x10^{4}$	$4.2\ x10^{2}$	$2.2\ x10^{2}$	$5.2x10^{2}$	$4.9\ x10^{2}$
14	—	—	$3.2x10^{4}$	$3.1x10^{4}$	$2.0x10^{4}$	$7.1x10^{3}$	$1.0\ x10^{7}$	$2.0\ x10^{5}$	$9.9x10^{2}$	$1.2\ x10^{3}$	$5.3x10^{2}$	$6.8x10^{2}$
21	—	—	$8.8x10^{6}$	$1.1x10^{5}$	$4.0x10^{5}$	$1.2x10^{4}$	—	—	$3.2x10^{4}$	$1.2x10^{4}$	$8.8\ x10^{3}$	$8.1\ x10^{3}$
30	—	—	—	—	$7.7x10^{6}$	$4.0x10^{5}$	—	—	$3.3x10^{5}$	$1.9\ x10^{5}$	$5.4x10^{4}$	$2.4x10^{4}$
37	—	—	—	—	—	—	—	—	$2.1x10^{6}$	$5.9\ x10^{5}$	$7.4x10^{4}$	$7.1\ x10^{4}$
45	—	—	—	—	—	—	—	—	—	—	$1.5\ x10^{5}$	$9.0\ x10^{4}$
52	—	—	—	—	—	—	—	—	—	—	$1.0x10^{6}$	$1.0\ x10^{5}$
60	—	—	—	—	—	—	—	—	—	—	$1.2x10^{7}$	$8.2x10^{5}$

--- = Rejected, A = Aerobic, AN = Anaerobic

Table 2: Effect of storage temperature on Spore formers and Lactic acid bacteria, count /g of local and imported soft Taiz cheeses

Kind of cheese	**Local soft cheese**						**Imported soft cheese**					
Temperature of storage	**Room temperature at 28^{O} C**		**Cold temperature at 10 ^{O}C**		**Cold temperature at 4^{O}C**		**Room temperature at 28^{O} C**		**Cold temperature at 10 ^{O}C**		**Cold temperature at 4^{O}C**	
Time of storage in days	**SP**	**LA**	**SP**	**LA**	**SP**	**LA**	**SP**	**LA**	**SP**	**LA**	**SP**	**LA**
0	1.0x10	2.8 x10^{2}	1.1 x10	3.2 x10^{2}	1.0x10	1.9x10^{2}	6.0	2.0 x10^{1}	8.0	1.8x10^{1}	5.5	3.0 x10^{1}
7	6.0x10^{1}	1.0x10^{5}	9.8x10	1.0x10^{3}	5.2x10	4.0x10^{2}	2.2x10	1.5x10^{2}	9.0	4.1x10^{1}	6.2	5.0x10^{1}
14	—	—	4.0x10^{1}	3.8x10^{3}	1.0x10^{1}	7.4x10^{2}	4.0x10^{1}	8.2x10^{4}	9.0 x10	9.0x10^{2}	5.0x10	9.9x10^{1}
21	—	—	9.0x10^{1}	9.8x10^{3}	9.0x10^{1}	1.0 x10^{3}	—	—	3.0x10	9.0 x10^{2}	7.0x10	9.8x10^{1}
30	—	—	—	—	9.8x10^{1}	9.9 x10^{3}	—	—	8.2x10	1.4x10^{3}	9.1x10	1.2x10^{2}
37	—	—	—	—	—	—	—	—	1.0x10^{1}	7.2x10^{3}	9.9x10	8.4x10^{2}
45	—	—	—	—	—	—	—	—	—	—	1.0x10^{1}	1.0 x10^{3}
52	—	—	—	—	—	—	—	—	—	—	1.2x10^{1}	4.2x10^{3}
60	—	—	—	—	—	—	—	—	—	—	1.4x10^{1}	5.1 x10^{3}

--= Rejected , SP = Spore form , LA = Lactic acid

Table 3: Effect of storage temperature on Coli form group and *Salmonella* spp, count /g of local and imported soft Taiz cheeses

Kind of cheese	**Local soft cheese**						**Imported soft cheese**					
Temperature of storage	**Room temperature at 28^{O} C**		**Cold Temperature at 10 ^{O}C**		**Cold temperature at 4^{O}C**		**Room temperature at 28^{O} C**		**Cold temperature at 10 ^{O}C**		**Cold temperature at 4^{O}C**	
Time of storage in days	**C0L**	**SAL**	**CoL**	**SAL**	**CoL**	**SAL**	**CoL**	**SAL**	**CoL**	**SAL**	**CoL**	**SAL**
0	2.0	1.6	1.1	1.3	1.2	1.4	1.3	1.0	1.5	1.0	1.8	1.1
7	1.1x10	4.8	4.7	2.7	4.4	2.5	2.8	1.2	2.9	1.2	3.0	1.1
14	——	——	9.9	3.2	6.0	2.5	1.0x10	2.8	4.6	1.9	3.8	1.8
21	——	——	1.0x10	3.8	9.2	2.6	——	——	8.7	2.0	3.8	2.0
30	——	——	——	——	1.0x10	3.0	——	——	9.0	2.0	4.0	2.1
37	——	——	——	——	——	——	——	——	9.3	2.0	4.2	2.6
45	——	——	——	——	——	——	——	——	——	——	4.9	2.8
52	——	——	——	——	——	——	——	——	——	——	5.9	3.2
60	——	——	——	——	——	——	——	——	——	——	6.9	3.4

---- = Rejected, CoL = Coli form group , SAL = *Salmonella*spp-----

Table 4: Effect of storage temperature on *Staphylococcus* spp and *Streptococcus* spp, counts /g of local and imported soft Taiz cheeses

Kind of cheese	**Local soft cheese**						**Imported soft cheese**					
Temperature of storage	**Room temperature at 28^O C**		**Cold temperature at 10 ^{O}C**		**Cold temperature at 4^{O}C**		**Room temperature at 28^O C**		**Cold temperature at 10 ^{O}C**		**Cold temperature at 4^{O}C**	
Time of storage in days	**STA**	**STR**	**STA**	**STR**	**STA**	**STR**	**STA**	**STR**	**STA**	**STR**	**STA**	**STR**
0	$7.0x10^1$	$2.0x10^1$	$1.8x10^1$	$2.1\ x10^1$	$2.0x10^1$	$3.0x10^1$	9.4	$1.2\ x10^1$	6.9	$1.1x10^1$	8.6	$1.2x10^1$
7	$1.0x10^3$	$3.0x10^4$	$2.0x10^1$	$2.8x10^2$	$1.5x10^1$	$2.2x10^2$	$8.0X10^1$	$9.2x10^2$	7.8	$2.6x10^2$	8.9	$2.4x10^2$
14	—	—	$3.1x10^2$	$1.0x10^3$	$8.8x10^1$	$1.0x10^3$	$1.0x10^3$	$2.0x10^4$	$2.0x10^1$	$3.0\ x10^2$	9.9x10	$2.4x10^2$
21	—	—	$4.1x10^2$	$1.0x10^4$	$1.7x10^2$	$5.6\ x10^3$	—	—	$3.4x10^1$	$2.8\ x10^3$	7.0x10	$1.0x10^3$
30	—	—	—	—	$7.5x10^2$	$1.9\ x10^4$	—	—	$4.4x10^1$	$6.2x10^3$	2.2x10	$2.1x10^3$
37	—	—	—	—	—	—	—	—	$7.9x10^1$	$1.0x10^4$	4.8x10	$4.2x10^3$
45	—	—	—	—	—	—	—	—	—	—	8.2x10	$8.9x10^3$
52	—	—	—	—	—	—	—	—	—	—	$1.1x10^1$	$1.2x10^4$
60	—	—	—	—	—	—	—	—	—	—	$3.5x10^1$	$1.4x10^4$

— = Rejected , STA = *Staphylococcus* spp , STR = *Streptococcus* spp

Table 5: Effect of storage temperature on *Bacillus* spp and *Clostridium* spp, counts /g of local and imported soft Taiz cheeses

Kind of cheese	**Local soft cheese**						**Imported soft cheese**					
Temperature of storage	**Room temperature at 28^{O} C**		**Cold temperature at 10 ^{O}C**		**Cold temperature at 4^{O}C**		**Room temperature at 28^{O} C**		**Cold temperature at 10 ^{O}C**		**Cold temperature at 4^{O}C**	
Time of storage in days	**BA**	**CL**	**BA**	**CL**	**BA**	**CL**	**BA**	**CL**	**BA**	**CL**	**BA**	**CL**
0	2.0x10	9.9	1.8x10	8.8	3.0x10	7.9	9.4	9.4	6.9	6.9	8.6	8.6
7	4.9x10^{1}	1.0x10^{1}	6.0x10	2.0x10	5.0x10	1.9 x10	2.0X10	3.0X10^{1}	9.9	9.8	1.3 x10	9.9
14	—		1.1x10^{1}	1.1x10^{1}	1.0 x10^{1}	7.0 x10	3.0x10^{1}	6.0x10^{1}	4.1 x10	5.0x10	3.5x10	3.0 x10
21	—		4.0 x10^{1}	9.0 x10^{1}	4.7x10^{1}	4.0 x10^{1}	—	—	4.4x10	8.4x10	7.0x10	5.0x10
30	—	—	—	—	5.1 x10^{1}	9.5x10^{1}	—	—	9.8 x10	1.4x10^{1}	9.2x10	9.2x10
37	—	—	—	—	—	—	—	—	1.9x10^{1}	7.9x10^{1}	1.8x10^{1}	1.8x10^{1}
45	—	—	—	—	—	—	—	—	—	—	2.2x10^{1}	8.2x10^{1}
52	—	—	—	—	—	—	—	—	—	—	3.1x10^{1}	1.1x10^{2}
60	—	—	—	—	—	—	—	—	—	—	3.5x10^{1}	1.5x10^{2}

— = Rejected, BA = *Bacillus* spp , CL = *Clostridium* spp

Table 6: Effect of storage temperature on *Enterococci* spp and proteolytic bacteria, count/g of local and imported soft Taiz cheeses

Kind of cheese	Local soft cheese						Imported soft cheese					
Temperature of storage	Room temperature at 28^{O} C		Cold temperature at 10 ^{O}C		Cold temperature at 4^{O}C		Room temperature at 28^{O} C		Cold temperature at 10^{O}C		Cold temperature at 4^{O}C	
Time of storage in days	EN	PR	EN	PR	EN	PR	EN	PR	EN	PR	EN	PR
0	8.7	1.0x10	7.9	9.9	9.1	1.0x10	9.4	9.0	8.9	6.9	9.1	8.6
7	1.0x10^{2}	1.0x10^{3}	6.9x10	5.0x10	4.0x10	4.0x10	6.0X10	8.0X10	1.0x10	7.8	9.9	8.9
14	—	—	8.1x10	6.1x10	5.8x10	2.8x10	2.8x10^{1}	1.0x10^{2}	3.0x10	3.0x10	1.0 x10	1.0 x10
21	—	—	1.1x10^{1}	9.1x10^{1}	9.7x10	7.7x10	—	—	8.4x10	3.4x10	7.0x10	4.0x10
30	—	—	—	—	2.5x10^{1}	4.5x10^{1}	—	—	1.4x10^{1}	8.4x10	9.2x10	8.2x10
37	—	—	—	—	—	—	—	—	7.9x10^{1}	2.9x10^{1}	1.8x10^{1}	1.8x10^{1}
45	—	—	—	—	—	—	—	—	—	—	5.2x10^{1}	7.2x10^{1}
52	—	—	—	—	—	—	—	—	—	—	8.1x10^{1}	9.1x10^{1}
60	—	—	—	—	—	—	—	—	—	—	9.5x10^{1}	1.0x10^{2}

— = Rejected , EN =*Enterococc* SPP , PR = Proteolyticbacteria

Table 7: Effect of storage on Yeast and Moulds and *Psychrophilic* bacteria, count /g of local and imported soft Taiz cheeses

Kind of cheese	**Local soft cheese**						**Imported soft cheese**					
Temperature of storage	**Room temperature at 28^{O} C**		**Cold temperature at 10 ^{O}C**		**Cold temperature at 4^{O}C**		**Room temperature at 28^{O} C**		**Cold temperature at 10 ^{O}C**		**Cold temperature at 4^{O}C**	
Time of storage in days	**YM**	**PS**	**YM**	**PS**	**YM**	**PS**	**YM**	**PS**	**YM**	**PS**	**YM**	**PS**
0	1.2x10	9.2	2.0x10	8.9	2.1 x10	9.7	9.4	8.4	9.0	5.9	8.7	7.6
7	4.0x10^{2}	9.0x10^{1}	9.1x10	9.5 x10	2.2 x10	5.0x10	1.7 x10	3.0X10	1.0x10	8.8	1.0x10	1.0x10
14	—	—	1.2x10^{1}	8.1x10^{1}	8.0x10^{1}	4.8x10^{1}	6.0x10^{1}	2.0x10^{1}	2.9x10	4.0x10	1.0x10	2.0 x10
21	—	—	1.2x10^{2}	6.1x10^{2}	1.0x10^{2}	9.7x10^{1}	—	—	4.1x10	8.4x10^{1}	9.1x10	9.5 x10
30	—	—	—	—	6.0x10^{2}	7.5x10^{2}	—	—	1.1x10^{1}	1.4x10^{2}	1.4x10^{1}	2.2x10^{1}
37	—	—	—	—	—	—	—	—	2.2x10^{1}	8.9x10^{2}	2.5x10^{1}	6.8x10^{1}
45	—	—	—	—	—	—	—	—	—	—	9.5x10^{1}	1.2x10^{2}
52	—	—	—	—	—	—	—	—	—	—	1.0x10^{2}	5.1x10^{2}
60	—	—	—	—	—	—	—	—	—	—	1.2x10^{2}	9.9 x10^{2}

--- =Rejected, YM = Yeast and Moulds ,PS = Psychrophilic bacteria

Table 8: Enumeration and isolation of *Bacillus* spp from control Local and imported soft Taiz cheeses

No. of groups	Microorganism	Local soft cheese stored at 28°C		Imported soft cheese Stored at 28°C		No. of difference between local and imported	Percent of difference between local and imported
		No. of isolates	Percent of total isolates	No. of isolates	Percent of total isolates		
G-1	***Bacillus.*** **subtilus**	5 .0	33.33	4.0	33.33	1.0	33.33
G-2	***B. pumilus***	3 .0	20.00	2 .0	16.66	1 .0	33.33
G-3	***B.*** **circulans**	2 .0	13.33	2 .0	16.66	0 .0	0 .0 0
G-4	***B.*** **lentus**	4 .0	26.66	3 .0	25 .00	1 .0	33.33
G-5	***B*** **.mecerans**	1 .0	0 6.66	1 .0	8.33	0 .0	0. 00
Total		**15 .0**	**100%**	**12 .0**	**100%**	**3 .0**	**100%**

B = *Bacillus* bacteria

Table 9: Number and percent of Lactic acid bacteria isolated from Control local and imported soft Taiz cheeses

No. ofgroups	*Microorganism*	Local soft cheese storage at 28°C		Imported soft cheese storage at 28°C		No. of difference between local and imported	Percent of difference between local and imported
		No. of isolates	Percent of total isolates	No. of isolates	Percent of total isolates		
G-1	***Streptococcus spp***	1 4	58.33	9. 0	64.28	5. 0	50
G-2	***Bifidobacteriumspp***	5. 0	20.83	3. 0	21.42	2. 0	20
G-3	***Leuconostocspp***	1. 0	4.16 6	0. 0	0. 00	1. 0	10
G-4	***pediococcusspp***	3. 0	12.5 0	2. 0	14.28	1. 0	10
G-5	***Lactobacillus spp***	1. 0	4.16 6	0. 0	0. 00	1. 0	10
Total		**2 4**	**100%**	**1 4**	**100%**	**1 0**	**100%**

REFERANCESES

A P H A 1999. Standard Methods for The Examination of Food and Dairy Products.14 th ed American Public Health Association, Washington. D. C.

Abd-Elaty A. M. 1994. Technological studies on smoked cheese. Ph. D. Thesis., Fac. Agric. Zagazig Univ., Banha branch. Egypt.

Abou-Dawood A., Soad H, Taha H. and Mohamed M. 2005. Chemical and microbiological quality of raw milk, soft and hard cheeses collected form some districts at Giza governorate. *Egyptian J. dairy Sci.* 33(2): 210- 215.

Ali R. M. 2010. Microbiological study on locally manufactured cheese in Taiz Governorate-Yemen Republic. M. Sc. Thesis, Fac. Sci., Taiz Univ., Rep. of Yemen.

Aly M. E., El-Shafie N. M. and Farag A. A. 1990. Bacteriological and chemical changes of rash cheese as affected by smoking. Egypt. J. Appl. Sci. 5 (7): 382 – 390.

Al-Zoreky N. and Sandine W. E. 1991. *Lactococcus* genus: a selective and differential agar medium. J. *Food Sci.* 56: 1729 – 1731.

Al-Zoreky N. S. 2000. Microbiological and compositional profile of market Taizy smoked cheese in Yemen .*Annals of Agric*. Sc.Moshtohor. 38 (1): 353 – 359. Issn 1110 – 0419 . Zagazig Univ., (Banh, branch) Egypt.

Bergey's Manual of Determinative Bacteriology. 1999. 18th ed. (R. E. Buchanan & N. E. Gibbons) the Williams & Wilkins Company. Baltimore.

Bergey's Manual of Systematic Bacteriology 1996. Vol. 2, eds. (Senath, Ph., Meir, N. S., Sharpe, E. M.) Williams & Wilkins, London, Los Angles, Sydney.

Blood R. M. and Curtis G. D. W. 1995. Media for Total Enterobacteriaceae, Coli forms and *Escherichia coli*. Int. J. Food Microbiol. 26: 93 –115.

Craven E. S., Lillard H. S. and Mecuri A. J. 1995. Survival of *Clostridium perfringens* during preparation of precooked Chicken parts. J. Food Technol. 38: 505-508

Dalloul S. M. 1987. Studies on Taiz cheese M. Sc. Thesis, Fac. Agric., Al-Azhar Univ., Egypt .

Dalloul S. M. 2000. Studies on smokes cheese. Ph. D. Thesis. Fac. Animal Production, Khartoum Univ. Republic of Soudan.

Difco 1994. Difco Manual of Dehydrated Culture Media Reagents for Microbiological and Clinical Laboratory Procedures. Difco, LapI. Inc. Detroit 1, Michigan. S. A.

El- Gendy S. M., Moharan M. A., Hanafy N. and Mohamed T. H. 2009. Studies on microbial pollutants of milk produced in Assiut Vicinity, Assiut Univ, Egypt. *Assiut. J. Agric. Sci.* 38 (3):17-28.

El-Baradie G., Agnes D., Buchet P. and Jean-Claude E. 2005. Identification of bacterial communities of Egyption Karish cheese using Molecular Fingerprinting Tools. *Egyptian J. Dairy Sci.* 33(1): 25-34.

El-Gendy S. M. 1993. Fermented foods of Egypt and the Middle east. *J. Food Prot.* 46: 358 – 367.

El-Sayed I. M., Richard J. and El-Shafei H. K. 1996. Antibacterial activity of *Enterococcus faceium* strains isolated from Domiati cheese against several lactic acid bacteria, saprophytic and pathogenic bacterial species. *Alexandria. J. Agric. Research* 41: 125 – 140.

El-Shamery G. R. 2001. Studies on spoilage of some foods. Ph. D.Thesis. Fac.Agric. Moshtohor, Zagazig Univ., Egypt.

El-Shamery G. R. 2007. Microbiological studies on Taiz cheeses. *Egypt. J. Appl. Sci.*, 22 (5): 520 –535.

Farzana K., Akhter S. and F. Jabeen F. 2009. Prevalence and antibiotic resistance of bacteria in two ethnic milk based products. Pak. J. Blot. 41: 935-943.

Galloway J. H. 1995. Production of soft cheese. *J. Society of Dairy Technology, Egypt* (21)48: 36 – 43.

Giffel M.C., Beumer B. A., Slaghui S. and Rombout F. 2008. Occurrence and characterization of psychrotrophic on farms in Netherlands. *Netherland Milk and Dairy J.* 49: 125 – 138.

Gomah N. H. 2008. Proteolysis activity of thermoduric bacteria isolated from milk. M. Sc. Thesis, Fac. Agric., Assiut Univ., Egypt.

Hassanin H. V. and Saeed A. B. 1996 . Yemen Cheese. World Anima. Rev. 60: 43 – 45.

Hauschild A. H. W. and Hilsfhimer R. 1994. Evaluation and modification of media for enumeration of *Clostridium perfringens* . *Appl. Microbiol. J.* 27: 78 – 82.

Holobrook R. and Anderson J. M. 1990. An improved selective and diagnostic medium for the isolation and enumeration of *Bacillus cereus* in foods. *Cand. J. Microbiol*. 26: 753 – 759.

Holt J. G., Sneath P. H. A., Nair N. S. and Sharp M. E. 1996. Bergey's manual of systematic bacteriology vol. (2) section 13 Endo spore-forming rods and cocci. Williams of Wilkins, Baltimore, USA.

Hussein A., Fatma A., Faith A. and Mohamed A. 2005. Quality and acceptability of processed cheese spreads made from total milk protein ate and casein. Co-precipitate. Egypt. J. Dairy Sci. 33(2): 261-277.

Iso 1999 : International Organization for Standardization Iso 1208 (1999).

Kaloyanov I. and Gogov I. 1997. Coliform bacteria in raw and pasteurized milk. Veterinary nomadic sink . Nouki. 14 , 46 – 52 . *Dairy Sci . Abst*., 41 (974).

Kotzekidou P. 1996. A microtiter tray procedure for a simplified identification of *Bacillus* spp. In spoiled canned foods. Food Microbiol. 13: 35-40.

Kousta M.; Mataragas M., Skandamis P. and Drosinos E. H. 2010. Prevalence and sources of cheese contamination with pathogens at farm and processing levels. Review. Food Cont. 21: 805 – 815.

Mossel D. A. A. and Taminge S. K. 1990. Methods for the microbiological examination of food (in Deutsch). Zeist. (1990) (C.F. Hammed 1995).

Nespolo C. R. and Brandelli A. 2011. Production of Bacteriocin-like substances by lactic acid bacteria isolated from regional ovine cheese. Brazil. J. Microbiol. 41: 1009 -1018.

Oxoide 1995 . The Oxoide Manual of Culture Media Ingredients and Other Laboratory Services . Oxide Limited, Hampshire, England 5 th (Ed).

Ozdemir S., Yangilar F. and Ozdemir C. 2010. Determination of microbiological characteristics Turkish Karin kamahi cheese packaged in differ material. African. J. Microbial. Res. 4 (9): 716 – 721.

Pitt J . I. and Hocking A. D. 1995. Fungi and food spoilage. Academic Press, Bubs. Sunday, New York, London.

Robinsen R. K. 2012: Microbiology of Milk and Their Products. Part two : Microbiology of Cheese. Dairy Microbiology. England, 9th (ed).Volume, 1. Part 2. Page (200-311). Food Science and Technology Department, Fac. Agric., Redding. Univ., United Kingdom. Elsevier Applied Science Publishers Ltd. University of Saod kingdom of Saudi Arabia (KSA).

Shaiban M. S. 1990. Use of dried skim-milk in manufacturing smoked cheese. M. Sc., Thesis, Fac. Agric. Moshtohor, Zagazig Univ. Egypt.

Shaiban M. S. 2000. Development of manufactures of smoked cheese. Ph. D.

Thesis. Fac. Agric., Pagdad Univ., Republic of Iraq.

Shaker R., Rabi A. and Banat A. 2004. Microbiological quality of halloumi cheese and the implementation of hazard analysis critical control points plan to production line. *Egypt. J. Dairy Sci*. 32(2): 291-303.

Shehata A. E. and El-Magthop M. N. 2012. Microbiology of cheese and fermented milk. Print two 2**th** Fac. Agric., Ain-Shams Univ. Page (20-511). Publishing Company, Academic Bookshop. Egypt.

Smith N. R. Gordon R. E. and Clark F. E. 1952. Aerobic spore forming bacteria Agricultural monograph No. 16. U.S.A. Dept. of Agriculture.

Sneath P. H. A., Mair S., Sharpe M. E. and Holt J. C. 1996. Bergey's Manual for Systematic Bacteriology, Vo l. 2. Williams and Wilkins co. Baltimore, Md, USA.

Te-Giffel M. C. Beumer R., Hoekstra J. and Rombouts F. M. 1999. Germination of bacterial spores during sample preparation. *J. Food Microbiol.* 12: 327 – 332.

Tzanetakis N. and Litop–Tzanetaki E. 1992. Changes in numbers and kinds of Lactic acid bacteria in feta and teleme, two Greek cheese from cows milk. *J. Dairy Sci*. 75: 1389 – 1393.

Tzanetakis N., Litop–Tzanetaki E. and Manolkidis K. 1997. Microbiology of Kopanisti, a traditional Greek cheese. *Food Microbial.* 4: 251 – 256.

الملخــص العربــي

دراسات ميكروبيولوجيه على بعض الأجبان الطرية في مدينة تعــز – اليمن

يهدف هذا البحث لدراسة تأثير أنواع مختلفة من التخزين على الجودة الميكروبيولوجية للجبنه الطرية المحلية والمستوردة والتي أخذت عيناتها من السوق المحلى لمدينة تعز في الجمهورية العربية اليمنية وتم تخزينها على درجات حرارة (٢٨– ١٠– ٤ o م) لمدة ستون (٦٠) يوما واعتبرت العينات المخزونة في الجو العادي عند (٢٨oم) كعينات ضابطة لبقية العينات المستوردة والمحلية وخلال فترة التخزين أجريت لها الاختبارات الميكروبيولوجيه المختلفة عند نقطة الصفر وكل أسبوع (٧) سبعة أيام حتى ظهور علامات الفساد عليها وكانت النتائج تشير إلى الأتي :-

١) التخزين عند ١٠oم أدى إلى :

أ- التقليل من إعداد الميكروبات بالنسب الآتية :(50.10 و٤٦,٣٦%) للميكروبات الهوائية و(٣٥,٢٥ ، ٣١,١١%) للميكروبات اللاهوائية و(٢٤,٨٤ ، ٢٨,٣٢%) للميكروبات المتجرثمة و(٣٣,١٢ ، ٣٣,٣٣%) للأجناس المنتجة لحمض الاكتيك و(٣٣,٧٢ ، ٣٥,٤٤%) لمجموعة الكلوليفورم و(٣٧,٦٣ ، ٣٦,٦٥ %) لأجناس السلمونيلا و(٤٢,٤٧ ، ٤٢,٤٧%) لأجناس الاستافيلوكوكاس و(٣٤,٣٩ ، ٣٦,٩٨%) لأجناس الستربتوكوكاس و(٣٤,٦١ ، ٣٣,٨٩%) لأجناس الباسلس و(٣٨,٦٦ ، ٣٤,٩٤%) لأجناس الكلوسترديم و(٣٩,٤٦ ، ٣٨,٧١%) لأجناس الانتروكوكاى و(٥١,١٦ ، ٥٧,٥٢%) لأجناس البروتوليتك و(٣١,١١ ، ٣٢,٩٥ %) لبكتيريات السكروفيلك و(٤٧,١١ ، ٤٥,٥٨%) للفطريات والخمائر. لكلا النوعين المستورد والمحلى بالترتيب مقارنة بعينات الكنترول .

ب- إلى زيادة مدة التخزين (٢١) يوما في العينات المحلية و(٣٧) يوما للعينات المستوردة في كلتا العينتين.

٢) التخزين عند ٤oم أدى إلى:

أ- للتقليل من أعداد الميكروبات بالنسب الآتية :(٥٢,١١ ، ٥٣,٤٤%) للميكروبات الهوائية و(٣٣,٣٣ ، ٣٩,١١ %) للميكروبات اللاهوائة و(٣٧,٩٩ ، ٣٤,٦٦%) للميكروبات المتجرثمة و(٣٩,٩٦ ، ٤٩,٢٢%) للأجناس المنتجة لحمض اللاكتيك و(٣٨,٢٢ ، ٤١,٩٩%) لمجموعة الكلوليفورم و(٤١,٥٦ ، ٤٢,٨٩%) لأجناس السلمونيلا و(٤٥,٥٩ ، ٤٩,٩٩%) لأجناس الاستافيلوكوكاس و(٣٨,٩٧ ، ٣٦,٢٢%) لأجناس الستربتوكوكاس و(٣٦,٨٤ ، ٣٧,٦٦%) لأجناس الباسلس و(٣٦,٩٦ ، ٤٦,٦٧%) لأجناس الكلوستريديم و(٤٦,٥٩ ، ٥٨,٩٩%) لأجناس النتروكوكاى و(٥٩,٩٤ ، ٦٦,١١%) لأجناس البروتوليتك و(٤٢,٤١ ، ٤٣,٤٣%) لبكتيريا السكروفليك و(٦٢,٧١ ، ٦٣,٨٩%) للفطريات والخمائر لكلا النوعين المحلى والمستورد بالترتيب مقارنة بالعينات الضابطة.

ب- إلى زيادة مدة التخزين(٣٠) يوما في العينات المحلية و(٦٠) يوما للعينات المستوردة مقارنة بعينات الكنترول في كلتا العينتين.

٣) العزل والتصنيف : تم عزل وتصنيف (٦٥) عزله بكتيرية من العينات تحت الدراسة (٢٧) منها صنفت إلى خمس مجموعات من جنس الباسلس و(٣٨) منها صنفت أيضا إلى خمسة مجموعات من الأجناس المنتجة لحمض اللاكتيك وللمقارنة (٢٦ عزله لكلا الجنسين من النوع المستورد ، ٣٩ عزله لكلا الجنسين من النوع المحلى).

ومن هذه الدراسة يتضح أن التخزين عند درجات الحرارة المنخفضة من شأنه أن يقلل التلوث بالكائنات الدقيقة ونشاطها الأنزيمي في ألجبنه المحلية والمستوردة. وعليه فأننا نوصى بتخزين أنواع ألجبنه في درجات حرارة منخفضة ومناسبة.