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The Implementation of HACCP (Hazard Analysis Critical Control Point) to UF-FETA Cheese Production Lines

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Abstract: Application of HACCP in the cheese-making industry proved to be beneficial and profitable because the industry managed to cut down the material (milk) and final product (cheese) losses and to build up consumer confidence by producing safe cheese of enhanced and consistent quality. This research discusses the implementation steps of HACCP and provides a detailed review of each step for UF-FETA cheese. This cheese is a kind of fresh and soft cheese, which is sold before ripening and is a popular type of cheese in Iran. Due to its freshness, low humidity and lower level of salt, this cheese is in higher risk of contamination than other traditionally produced ones. Therefore, HACCP analysis of this product is important issues for public health.

Key words: Critical control point, feta cheese, HACCP, ultrafiltration, UF-FETA

INTRODUCTION

In 1993, the European union issued a food hygiene directive (EU, 1993) establishing a general requirement for all food products to adopt a risk based food safety management system with the principles of the internationally accepted system Hazard Analysis Critical Control Point (HACCP) recommended. It is generally, recognized that the cheese production with desirable organoleptic characteristics and safe for consumption can only be assured when all aspects include material, process and storage (from farm to fork) are to be controlled. In 1993, Codex Alimentarius Commission elaborated a 12-part method for the application of HACCP (Table 1). This has achieved international recognition and as such, has become the definitive method of applying HACCP principles (Taylor, 2008).

HACCP was 1st used to design regulations on low- acid and acidified canned foods, in order to protect the public health from botulism. As cheese is a biologically and biochemically dynamic and unstable dairy product, adaption of HACCP in cheese industry is important for ensuring the safe production of cheese (Fox, 1993). The cheese industry presents 2 distinguishing features its main raw material is originally a single, Primary agricultural product and a killing step can be applied to central many potential microbiological hazards without significantly changing the final product (Van Schthorst and Kleiss, 1994).

Table 1: The codex protocol for the application of HACCP principles

Preliminary	Assemble HACCP plan
Procedures	Describe product
	Identify intended use
	Construct flow diagram
	On-site confirmation of flow diagram
Principle	
1	List all potential hazards
	conduct a hazard analysis
	consider control measures
2	Determine Critical Contral Points (CCPs)
3	Establish critical limits for each CCP
4	Establish a monitoting system for each CCP
5	Establish corrective actions for each CCP
6	Establish verification procedures for each CCP
7	Establish documentation and record keeping

There are several studies about implementation of HACCP for dairy products, but a significant differences exists from sector to sector and from plant to plant (USDA, 1999).

In Iran marketing, UF-FETA cheese with 48% has recently been a very popular cheese and replaced to traditional Feta-cheese which has been led to reduction in outbreak of diseases, although, UF-FETA cheese is categorized as fresh cheese and these is high potential for cross-contamination, which may threaten consumer health.

The objective of this study, is to identify critical control points as a guideline for UF-FETA cheese production line from milk receiving to release of products.

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Table 2: Chemical and microbiological composition of feta- cheese based on ISIRI 6629

Chemical composition		Microbiological composition	
Moisture	Max 60%	Coliform count	Max 100 cfu g^{-1}
Fat in dry matter	25-45%	*Escherichia coli*	Negative
Protein	Min 6%	*Staphylococcia*	Max 100 cfu g^{-1}
pH	Max 5.2	Yeast	Max 100 cfu g^{-1}
Salt	Max 4%	*Salmonella*	Negative in 25 g
Acidity	50-250 Dornic		
Texture	Firm		
Taste	Slightly acid test		

DESCRIPTION OF UF-FETA CHEESE

UF-FETA cheese is one of the most popular, white brine fresh cheese produced in Iran (Anifantakis, 1991). It is prepared by pasteurized concentrated cow's milk in the ratio of 4.8:1, microbial coagulative enzyme, culture and salt then packaged in polyethylene cups with aleofoil sealing and can be sold during 3-5 days after processing (APV manual). Final characteristics of product is according to national standards (ISIRI 6629) as shown in Table 2.

UF-FETA CHEESE FLOW DIAGRAM

After collection, raw milk is chilled to below 4°C and kept at this temperature during its transportation to the dairy plant. After receiving milk and laboratory control, it is mechanically filtered and stored in silo tanks at 4°C.

The milk is standardized (Fat: 3.5-4%), then passed from 2 parallel bactofuge and pasteurized at 72°C ×15 S.

The pasteurized milk with 50°C is concentrated with 20 KDa membrane, then retentate (concentrated section with 34% total solid) is homogenized at 75 bar and pasteurized at 78°C×60 S and cooled down to 32-34°C. then starter culture is added automatically to retentate (3% v v^{-1}) in prefermentation tanks and after decreasing pH to 6-6.3, retentate is pumped to packaging line. In this study, retentate and rennet are dosed into cups that are passed in front of Ultra Violet (UV) lamps before the cups are conveyed to coagulation tunnel. The cups holding time in coagulation conveyor is approximately 20 min then the cups enter to packaging machine. In order to separate, the cheese and salt a parchment paper is put on top of cheese. An intended amount of salt 2.5-3.5% is dosed and put on top of the parchment papers. After salting the cup is sealed with aleo-foil land is moved to a warm storage at a temperature of 25-27°C in order to acidify to minimum pH as well as make cheese separate whey which has to dissolve the salt and become brine. The cheese stays in warm storage until the pH has decreased below 4.7. After warm storage the cheese must be turned and transferred to cold store and cooled down to 2-5°C (Fig. 1).

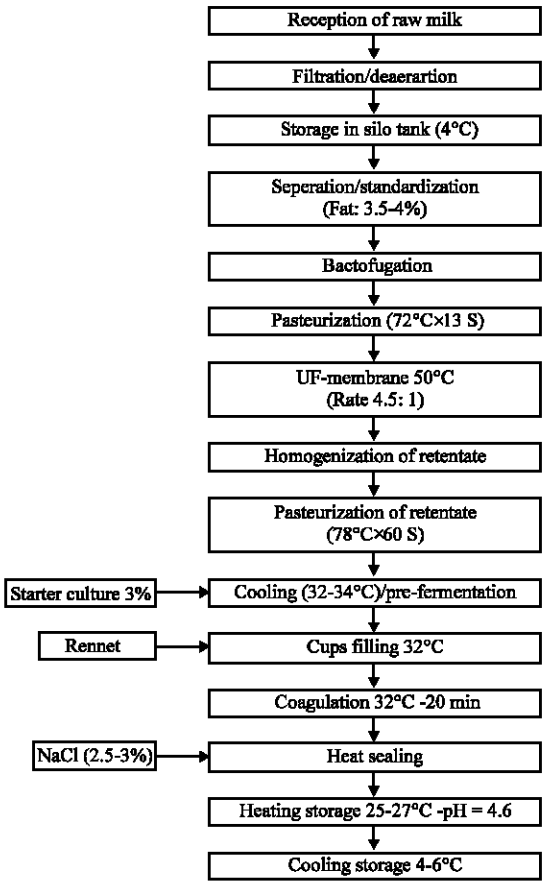

Fig. 1: Flow diagram of UF-FETA cheese production (Anifantakis, 1991)

CRITICAL CONTROL POINTS IN PRODUCTION LINE

The hazard analysis and CCP determination for UF-FETA cheese using decision tree are summarized in Table 3.

Receiving of raw milk: There are several factor that ensure the high quality of raw milk, biological, chemical and physical hazards are occasionally identified in raw milk. Raw milk is a magnificent medium for the growth of microorganisms which can be derived from the udder, the environment, the milk handling equipment and the personel (Mossel *et al*., 1995). *Escherichia coli*, *Staphylococcus aureus*, *Corynebacterium bovis*, *Streptococcus agalactiae*, *Streptococcus dysgalactiae* and *Streptococcus uberis* may cause under certain circumstances mastitis, leading to significant economic losses (Elbers *et al*., 1998; Barkema *et al*., 1998). In winter months, feed and bedding are the main sources of thermoduric spoilage organisms, while milk handling

Table 3: Hazard analysis and CCP determination chart of UF-FETA cheese product

			Decision tree				CCP
Material/process step	Category of hazard	Control measures	Q^1	Q^2	Q^3	Q^4	Y/N
Raw milk receiving	M, P, C: Survival of pathogenic organisms	Certified producer					
	Foreign materials Antibiotics	Adequate receiving Lab analysis sheet					
		Visual inspection	Y	Y	-	-	Y
Raw milk storage	M: Growth of psychrotrophic and pathogens	Correct setting of storage temperature (6°C) for not >72 h					
		Tank cleaning (sanitation)	Y	Y	-	-	Y
Milk pasteurization and Bactofugation	M: Survival of pathogenic organisms	Effective pasteurization					
	Special spore producing bacteria	Strict adherence to HTST, temperature and time					
		Sanitation of plates and control of CIP efficiency					
		Effective Bactofugation and control of its rate	Y	Y	Y	Y	N
Ultrafiltration	M: Cross contamination	Effective CIP (sanitation) program	Y	N	N	-	N
Homogenization	M: Cross contamination	Effective CIP (sanitation) program					
		Control of homogenizer pressure	Y	N	N	-	N
Retentate pasteurization	M: Survival of pathogenic organisms	Effective pasteurization					
		Strict adherence to HTST, temperature and time					
		Sanitation of plates and control of CIP efficiency	Y	Y	-	-	Y
Stater preparation	M, C: Survival of pathogenic organisms	Effective pasteurization					
		Effective CIP (sanitation) program and tank cleaning					
	Antibiotics and other culture inhibitor additives	Lab analysis sheet	Y	Y	-	-	Y
CIP and sterilization of pipeline and tanks	M: Growth of pathogenic organisms and contamination of product	Lab analysis sheet					
		Control of soda and acid concentration,temperature and conduction time	Y	Y	-	-	Y
Fermentation	M: Growth of pathogenic organisms	Effective CIP (sanitation) program	Y	N	N	-	N
Cuping	M, P: Survival of pathogenic organisms	Certified cup producer					
	Presence of foreign objects	Visual inspection					
		Effective cup sterilization through UV-lamps	Y	N	Y	N	Y
Rennet preparation	M: Survival of pathogenic organisms	Effective water sterilization through UV-lamps					
		Tank cleaning (sanitation)	Y	N	Y	N	Y
Coagulation	M: Mold and yeast contamination through air	Effective air sterilization through HEPA filters					
		Effective sanitation and disinfection program					
		Lab analysis sheet	Y	N	Y	N	Y
Salting	M, P: Microbial contamination through salt	Certified salt producer					
		Visual inspection					
	Foreign materials	Lab analysis sheet	N	-	N	N	Y
Sealing	M: Arrival of microorganism through air	Effective air sterilization through HEPA filters					
		Effective sealing and control of sealing temperature	Y	N	Y	N	Y
Warm storage	M: Growth of pathogenic organisms	Correct setting of storage temperature (25-28°C)					
		Control of pH decreasing (4.7)	Y	-	-	Y	Y
Cold storage	M: Growth of pathogenic organisms	Correct setting of storage temperature (below 5°C)	Y	-	-	Y	Y

M = Microbiological; C = Chemical; P = Physical

equipment is the major source of gramnegative, psychrotrophic spoilage bacteria. Employees suffering clinical symptoms of infection and feces may contaminate milk with *Campylobacter* and *Salmonella*.

Antibiotics (Dasenbrock and LaCourse, 1998), mycotoxins (Van Egmont *et al*., 1997), radioactive material, agricultural chemicals (Blu¨thgen and Heeschen, 1997), polychlorinated biphenyls (Blu¨thgen *et al*., 1997) and poisonous plants may enter milk through intra-mammary therapy and through transfer from the feed or the environment. These substances may cause strong allergic reactions, carcinogenesis and stomach irritation to the consumer and they may adversely affect the technology of dairy products (Troutt *et al*., 1995).

Table 4: Raw milk quality standards

Quality characteristics	Limits[a]	Action level[a]
Acidity (%)	0.16-0.17	>0.21
Standard plate count (mL)	<100,000	>200,000
Somatic cell count (mL)	150,000-400,000	>750,000
Freezing point (°C)	≤-0.535	>-0.530
Inhibitors/antibiotics	Negative	Positive
Pesticides residue	<FDA standard	>FDA standard

[a]Limits and action level according to the ISIRI standard, company specification and customer requirements

For example, antibiotic residue can act as an inhibitor because low level of antibiotic residue results in reduced rate of acidification, which may influence moisture contents and result in higher cheese pH. Elevated levels of antibiotic can result to complete cessation of acidification after renneting and thus an abnormally high cheese pH. This problem has destructive effect on end product quality (Donnelly, 2001). Table 4 shows the example initial standards for milk before processing to cheese as part of a company policy for milk receiving.

After receipt, the milk is filtrated in order to remove a considerable portion of the visible sediment and any extraneous material that represents a physical hazard.

Raw milk storage: Ideally, milk should be processed directly after being received, if it is not possible, the raw milk should be cooled down to temperature below 6°C (Dijkers *et al*., 1995). During chilling, although the growth and propagation of mesophilic bacteria are reduced, psychrotrophic bacteria can develop very rapidly. Moreover, at temperatures below 6°C, *Bacillus cereus* can grow and form spores, which are unaffected by pasteurization. *Bacillus cereus* has great importance because it is capable of producing food poisoning toxins (Van Heddeghem and Vlaemynck, 1992; Christiansson, 1992; Griffiths, 1992). To avoid the risk of potentially troublesome microorganisms in raw milk, fresh milk should be kept at the lowest possible temperature (4°C) and used within 72 h (Van Den Berg, 1986).

Extended refrigerated storage of raw milk has destructive effect on quality of product, because of growing of psychrotophic bacteria that can produce heat resistante proteolytic and lipolytic enzymes (Sorhauge and Stepanik, 1997). In order to reduce this effects on extended storage milk, thermization can be conducted (65°C×15 S) (Varnam and Sutherland, 1996).

Bactofugation: Bactofugation is used to remove spores in cheese making milk and is very effective in eliminating spore of clostridium tyrobotyricum. This microorganism can produce late gas in cheese products. The design of bactofuge is essentially similar to the separator but is modified in such a way that separates only bacteria and spors (Fox *et al*., 2000).

In UF-FETA cheese production line to increase efficiency, 2 bactofuge is fitted parallel ,which ultimately can decrease 80% of total count and >99.5% of raw milk spores. This stage is CCP and for controlling of this point, rotation rate and discharge duration must be checked.

Pasteurization of raw milk and retentate: Pasteurization of raw milk has identified as a process CCP in manufacture of all milk products. Pasteurization (72°C×15 S) will destroy all pathogens of concern in raw milk, also extends keeping quality of products by reducing the number of spoilage microorganisms derived from raw milk (Arvanitoyannis and Mavropoulos, 2000). According to UF-FETA cheese flow chart and according to decision tree for that pasteurization of retentate is CCP.

During ultrafiltration of milk, macromolecules such as milk protein, fat and bacteria are retained and concentrated. Increase in the number of bacteria during UF can occure either due to their retention and concentration or growth. Ultrafiltration is carried out at high temperature (50-55°C) to reduce Proliferation of mesophilic bacteria, however, growth of thermophilic and thermoduric bacteria can occur and cause clotting of retentate (Premaratne and Cousin, 1991). Therefore, pasteurization of retentate is conducted immediately after ultrafiltration at (78°C×305) and the insufficient heat treatment or recontamination of pasteurized retentate is very dangerous. The pasteurization efficiency should be controlled by establishing management procedures, including: maintenance of correct temperature and holding time, the installation and correct operation of a flow diversion valve to ensure that under processed product is not carried forward, ensuring that pipelines and valves cannot be arranged and or failed in such a way that pasteurized product or pasteurization lines could contaminated and efficiency of Clean-In-Place (CIP) must be checked periodically (Dijkers *et al*., 1995; Mortimore and Wallace, 1995).

Starter culture preparation: In UF-Feta cheese production the following cultures of lactic acid bacteria are used: *Lactobacillus bulgaricus-streptococcus* thermophilus as thermophil bacteria and lactococcus lactis, lactococcus diacety lactis as mesophil bacteria (Zerfiridis, 1989). The culture is added to pasteurized cooled skim milk (90°C×30 min) at 30-32°C automatically with dosing pump in amount of 3-3.5% and incubated in this temperature until attaining pH to 4.7 and then cooled as soon as possible (Abd El-Salam *et al*., 1993). This stage is CCP and antimicrobial residues of skim milk, CIP efficiency and microbial cross contamination must be controlled. The prepared culture must be used by 24 h, extended storage time is a high risk factor for hazards.

CIP and sterilization of pipeline and tanks: The nature of dairy products meat that possibility for deposits forming on the surface of process equipments as a potiontial source of contamination (Mortimore and Wallace, 1995). It was well known that CIP is universal control point in dairy plants for ensuring a finished product free from contamination. The success in cleaning any vessel or pipeline circuit in place depends on 5 consideration: Sanitizer contact time, temperature, pressure-concentration of soda/acid and time/temperature of sterilization and ensuring that there isn't any blind spot at system (Varnam and Sutherland, 1996).

There was study provide the evidence of existence of biofilms even after CIP and sanitization treatment in different segments of pasteurization lines (Sharma and Anand, 2002). Biofilm is a multicultural community anchored to a substratum and embedded in organic polymer matrix. The occurrence of biofilms can caused by post-processing contamination leading to lowered shelf-life of product and transmission of disease (Allison and Gilbertu, 1992; Carpentier and Cerf, 1993; Mittelman, 1998). In addition, it also, leads to mechanical blockage, impairment of heat transfer, increase in fluid frictional resistance and corrosion of metal (Russel, 1993). For control of biofilm it is suggested that iodophore at a concentration of 10 ppm with a contact time of 20 min be periodically used (Sharma and Anand, 2002).

Rennet preparation and cuping: In UF-FETA cheese production, the cups should be purchased from certified supplier and in order to decreasing of microbial cross contamination (Tacker *et al*., 2002), UV-lamps are used for sterilization of cups and water that be used for rennet preparation.

Ultraviolet processing involves the use of radiation from the ultraviolet region of the electromagnetic spectrum for purpose of disinfection. Typically, the wave length for UV processing ranges from 100-400 nm.

For disinfection of them, it is essential that all part of product receive a UV radiant exposure of at least 400 j m^{-2} to reduce human pathogens and viruses by at least 4 log cycle (Eccleston, 1998).

Coagulation stage: To prevent the contamination and growth of air borned mold in fresh cheese, HEPA (High Efficiency Particulate Air) should be used in packaging line and it can remove at least 99.97% air borned particle 0.3 μm in diameter especially mold spores as a potential source of infecting cheese. HEPA filter is fitted in coagulation tunnel and packaging machine to proper operation, microbial inspections should be carried out periodically (Mauropoulos and Arvanitoyannis, 1999).

Control of salt amount: Dry salt is added to cheese by packaging machine and controlling of added salt is very important because NaCl influences cheese ripening principally through its effects on water activity but it probably has some more specific effects also. Among the principal effects of salt are: Control of microbial growth and activity; control of the various enzyme activities in cheese; syneresis of the curd and thus in a reduction in cheese moisture, which also influences the above; Physical changes in cheese proteins which Influence cheese texture, protein solubility and probably protein conformation (Guinee and Fox, 1987; Guinee, 2004).

pH is decreased after salting by acid lactic production via lactic bacteria, at temperature 25-27°C, presumably due to the continued action of the starter at S/M levels <5% but at higher level of S/M starter activity is reduced abruptly, as indicated by high level of residual lactose and high pH. The quality of cheese is also reduced sharply at >5% S/M (Pappas *et al*., 1996).

Warm storage: Control of pH or acidification plays a number of important roles in cheese including controlling or preventing the spoilage or pathogenic microorganisms, promoting synersis and hence, helping with determination of cheese composition, particularly the moisture content of microorganisms, so feta should not be cooled unless it has reached a pH value of at least 4.6, otherwise the cheese will be converted into a soft, creamy mass similar to mud (Guinee and Fox, 1987).

The rate and extent of acidification has a major impact on cheese texture via demineralization of the casein micelles. Control of pH is CCP that is occurred at warm storage.

Cold storage temperature: To prevent growth of undesirable and temperature related of microorganisms as cross contamination, the temperature should be constantly monitored. The characteristic of specific cheese variety will dictate the potential for growth and survival of microbial pathogens and with fresh soft cheese like UF-FETA type, presenting a higher risk for growth and survival of pathogens than old hard cheese where a combination of factors in chiding pH, salt content, water activity and storage temperature interact to render cheese safe microbiologically (Sandrou and Arvanitoyannis, 2000).

REFERENCES

Abd El-Salam, M.E., E. Alichanidis and G.K. Zerfiridis, 1993. Domiati and Feta Type Cheeses. In: Fox P.F. (Ed.). Cheese. Chem. Physics Microbiol., 2: 301-335. ISBN: 0-412-53510-6.

Allison, D.G. and P. Gilbert, 1992. Bacterial biofilms. Science Progress, 76: 305-321.

Anifantakis, E.M., 1991. Traditional Feta Cheese. Feta and Related Cheeses. 1st Edn. In: Robinson, R.K. and A.Y. Tamine (Eds.). Ellis Horwood Limited, England, 300: 49-69.ISBN: 10: 0747600775,13:978-0747600770.

Arvanitoyannis, I.S. and A.A. Mavropoulos, 2000. Implementation of the Hazard Analysis Critical Control Point (HACCP) system to Kasseri/Kefalotiri and Anevato cheese production lines. Food control. 11: 31-40. DOI: 10.1016/S0956-7135(99)00061-4.

Barkema, H.M., Y.H. Schukken, T.G.M. Lam, M.L. Beiboer, H. Wilmine, G. Benediktus and A. Brand, 1998. Incidence of clinical mastitis in dairy herds grouped in three categories by bulk milk somatic cell counts. J. Dairy Sci., 81: 411-419. PMID: 18349229. http://jds.fass.org/cgi/content/abstract/81/2/411?maxtoshow=andHITS=10andhits=10andRESULTFORMAT=andauthor1=BARKEMAandsearchid=1andFIRSTINDEX=20andsortspec=relevanceandresourcetype=HWCIT.

Blu¨thgen, A., R. Burt and W.H. Heeschen, 1997. Persistent polyhalogenated environmental chemicals. Residues and Contaminants in Milk and Milk Products. IDF Special Issue 9701, Brussels, Belgium, pp: 89-107.

Blu¨thgen, A. and W.H. Heeschen, 1997. Parasiticides. Residues and contaminants in milk and milk products. IDF Special Issue 9701, Brussels, Belgium, pp: 35-44, 54-64.

Carpentier, B. and O. Cerf, 1993. A review: Biofilms and their consequences, with particular reference to hygiene in the food industry. J. Applied Bacteriol., 75: 499-511. PMID: 8294303.

Christiansson, A., 1992. The toxicology of *Bacillus cereus*. Bull. IDF, 275: 30-35.

Dasenbrock, C.O. and W.R. LaCourse, 1998. Measuring traces of antibiotics in milk. Chem. Technol. Jan., pp: 26-33.

Dijkers, J.H., T. Huurnink, P.P.L. Pennings and M.G. Van Den Berg, 1995. An example of HACCP application in an existing pasteurized milk plant, following the Codex Alimentarius model. Bull. IDF., 302: 11-34. http://www.fil- idf.org/docsharenoframe/netservices/documents/viewpaperpublication.aspx?PortalSource=2331andDocID=3745.

Donnelly, C.W., 2001. Factors associated with hygienic control and quality of cheeses prepared from raw ilk: A review. Bull. Int. Dairy Fed., 369: 16-27.

Eccleston, B., 1998. UV intensity levels affected by water quality. Water Technol., 21(5): 61-68.

Elbers, A.R.W., J.D.P. Miltenburg, H.W. Barkema and Y.H. Shukken, 1998. Risk factors for clinical mastitis in a random sample of dairy herds from the southern part of the Netherlands. J. Dairy Sci., 81: 420-426. http://jds.fass.org/cgi/content/abstract/81/2/420?maxtoshow=andHITS=10andhits=10andResultformaT=andauthor1=ELBERSandandorexactfulltext=andandsearchid=1andFIRSTINDEX=0andsortspec=relevanceandresourcetype=HWCIT.

European Union (EU), 1993. Council Directive 43/93 of 14.6. 1993 on the hygiene of foodstuffs. Official Journal of the European Communities, L175, Brussels.

Fox, P.F., 1993. Cheese: An Overview. 2nd Edn. Cheese: Chemistry, Physics and Microbiology. In: Fox, P.F. (Ed.). Chapman and Hall, London, 601: 1-36. ISBN: 10: 0834213389,13:978-0834213388 .

Fox, F., E.P. Guine and M. Cogan, 2000. Fundamen. 1st Edn. Cheese Sci., 4 (608): 51-52. ISBN: 10: 0834212609.13: 978-0834212602.

Griffiths, M.W., 1992. *Bacillus cereus* in liquid milk and other milk products. Bull. IDF, 275: 36-39.

Guinee, T.P., 2004. Salting and the role of salt in cheese. Int. J. Dairy Technol., 57 (2-3): 99-109.

Guinee, T.P. and P.F. Fox, 1987. Salt in Cheese: Physical, Chemical and Biological Aspects. 2nd Edn. In Fox, P.F. (Ed.). Cheese: Chemistry, Physics and Microbiology, General Aspects. Elsevier Applied Science, Barking, Vol. 1601. ISBN: 10: 0834213389, 13: 978-0834213388.

Mauropoulos, A.A. and I.S. Arvanitoyannis, 1999. Implementation of hazard analysis critical control point to Feta and Manouri cheese production lines. Food Control, 10 (30): 213-219 DOI: 10.1016/S0956-7135(99)00021-3.

Mittelman, M.W., 1998. Structure and functional characteristics of bacterial biofilms in fluid processing operations. J. Dairy Sci., 81: 2760-2764. http://jds.fass.org/cgi/content/abstract/81/10/2760?maxtoshow=andHITS=10andhits=10andRESULTFORMAT=andauthor1=MITTELMANandandorexactfulltext=andandsearchid=1andFIRSTINDEX=0andsortspec=relevanceandresourcetype=HWCIT.

Mortimore, S. and C. Wallace, 1995. HACCP: A Practical Approach. Chapman and Hall, London.

Mossel, D.A.A., J.E.L. Corry, C.B. Struijk and R.M. Baird, 1995. Essentials of the Microbiology of Foods. 1st Edn. A Textbook for Advanced Studies. John Wiley and Sons, Chichester-New York, USA, pp: 736. ISBN: 10: 0471930369,13:978-0471930365.

Pappas, C.P., E. Kondyli, L. Voutsinas and H. Rand Mallatou, 1996. Effects of salting method and storage time on composition and quality of Feta cheese. J. Soc. Dairy Technol., 49: 113-118.

Premaratne, R.J. and M.A. Cousin, 1991. Microbial analysis and starter culture growth in retentates. J. Dairy Sci., 74 (10): 3284-3292. http://jds.fass.org/cgi/content/abstract/74/10/3284.

Russel, P., 1993. The formation of biofilms. Milk Industry, 95 (9): 10-11.

Sharma, M. and S.K. Anand, 2002. Biofilms evaluation as an essential component of HACCP for food/dairy processing industry-a case. Food Control, 13: 469-477. DOI: 10.1016/S0956-7135(01)00068-8. http://www.sciencedirect.com/science?_ob=ArticleURLand_udi=B6T6S-46FJ5KK-Hand_user=10and_rdoc=1and_fmt=and_orig=searchand_sort=dandview=cand_acct=C000050221and_version=1and_urlVersion=0and_userid=10andmd5=2cecd047da5e62693d7483c341ef7ea1.

Sorhauge, T. and L. Stepanik, 1997. Psychrtrophs and their enzymes in milk and dairy products. Trend in Food Sci. Technol., 8: 35-41.

Sandrou, D.K. and I.S. Arvanitoyannis, 2000. Implementation of Hazard Analysis Critical Control Point (HACCP) to the dairy industry Currentstatus and perspectives. Food Rev. Int., 16 (1): 77-111. DOI: 10.1081/FRI-100100283. http://www.informaworld.com/smpp/content~content=a713632311?words=sandrouandhash=1588372242.

Tacker, M., C. Hametner and B. Wepner, 2002. Determination of microbial contamination of plastic cups for dairy products and utilization of electron beam treatment for sterilization. Food Additives and Contaminants: Part A: Chemistry, Analysis, Control, Exposure and Risk Assessment, 19 (4): 178-184. DOI: 10.1080/02652030110070049. http://www.informaworld.com/smpp/content~content=a713810941?words=tackerandhash=3562012414.

Troutt, H.F., J. Gillespie and B.I. Osburn, 1995. Implementation of HACCP program on farms and ranches. 1 Edn. HACCP in Meat, Poultry and Fish Processing. In: Pearson, A.M. and T.R. Dutson (Eds.). Blackie Academic and Professional, London, pp: 36-57. ISBN-10: 0834213273,13:978-0834213272.

Taylor, E., 2008. A new method of HACCP for the catering and food service industry. Food Control, 19: 126-134. DOI: 10.1016/j.foodcont.2007.02.013. http://www.sciencedirect.com/science?_ob=ArticleURLand_udi=B6T6S-4N6FFKV-1and_user=10and_coverDate=02%2F29%2F2008and_alid=838501836and_rdoc=1and_fmt=highand_orig=searchand_cdi=5038and_sort=dand_docanchor=andview=cand_ct=9and_acct=C000050221and_version=1and_urlVersion=0and_userid=10andmd5=06f5752aaec08e870575f59a7c5c04cf.

USDA, 1999. Guidebook for the Preparation of HACCP Plans United States Department ofAgriculture Food Safety and Inspection Service.

Van Den Berg, M.G., 1986. Quality assurance for raw milk in the Netherlands. Neth. Milk Dairy J., 40: 69-84.

Van Heddeghem and Vlaemynck, 1992. Bulletin-International Dairy Federation.

Van Egmont, H.P., U.K. Svensson and J.M. Fremy, 1997. Mycotoxins, in Residues and Contaminants in Milk and Milk Products. IDF Special Issue 9701, Brussels, Belgium, pp: 79-88.

Van Schthorst, M. and T. Kleiss, 1994. HACCP in the dairy industry. Food Control, 5 (3): 162-166. DOI: 10.1016/0956-7135(94)90076-0. http://www.sciencedirect.com/science?_ob=ArticleURLand_udi=B6T6S-49KKRS0-1Mand_user=10and_coverDate=12%2F31%2F1994and_alid=838506103and_rdoc=1and_fmt=highand_orig=searchand_cdi=5038and_sort=dand_docanchor=andview=cand_ct=2and_acct=C000050221and_version=1and_urlVersion=0and_userid=10andmd5=ca433264690b06ec7c2b3236fdd7a55d.

Varnam, A.H. and J.P. Sutherland 1996. Milk and Milk Products. 1st Edn. Technology, Chemistry and Microbiology. Chapman and Hall, London, pp: 451. ISBN: 10:0834219557 ISBN-13: 978-0834219557.

Zerfiridis, G.K., 1989. Technology of milk products, cheese making. Thessaloniki, Greece, pp: 123-155. http://books.google.com/books?id=acVq7-yOXuUCandpg=PA301andlpg=PA301anddq=%22Zerfiridis%22+%22Technology+*+Milk+Products%22andsource=webandots=J0cTQwO1S_andsig=Q0NWnul_Had9-2vVItJEk9-BTGAandhl=faandsa=Xandoi=book_resultandresnum=1andct=results.