

قسم: المراقبة الصحية على الأغذية
كلية: الطب البيطري - جامعة أسيوط
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التقييم الميكروبيولوجي لللبن المركز والمحلى

أحمد عبدالحميد ، توفيق البسيوني ، مصطفى خليل

تم جمع عدد ٣٢ علبه من علب اللبن المركز والمحلى من أسواق مدينة أسيوط
لفحصها ميكروبيولوجيا ولتحديد الحالة الصحية لانتاجها .

وقد تبين من الفحص أن متوسط العدد الكلي للميكروباك وكذلك عدد الميكروبات
الكروية الكروية المعوية وعدد الطحالب والفطريات في الجرام الواحد على التوالي
١٠×١٢٨,٤ ، ١٠×٤٥,١ ، ٠,٣٦٦,٣ كما تم عزل عدد من الميكروبات بنسب متفاوتة
بينما لم يتم عزل ميكروب السالمونيلا، الميكروب المكور العنقودي الذهبي والميكروبات
السبحية القولونية .

وقد تم مناقشة الأهمية الصحية لوجود بعض الأنواع من البكتريا والفطريات
والطحالب على الصحة العامة وكذلك تأثيرها على جودة هذ النوع من منتجات الألبان .

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MICROBIOLOGICAL EVALUATION OF CONDENSED MILK (With Two Tables)

By

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SUMMARY

32 random samples of full cream sweetened condensed milk (Carnation and Alaka) were collected from Assiut City markets for microbiological evaluation. The mean value of total colony, enterococci and yeast and mold counts were 128.4×10^2 , 45.1×10^2 and 66.3/g. respectively. Only four of the examined samples (12.5%) do not comply with the standard recommended by A.P.H.A. for the total bacterial counts. Enterococci, Micrococcus, Anaerobes, Aspergillus sp., Cladosporium sp., Penicillium sp., Mucor sp. and Alternaria could be isolated in different percentages, while salmonellae, Staph. aureus, Bacillus cereus and coliforms could not be detected. The public health hazard of each isolate was discussed.

INTRODUCTION

Dairy products of reduced moisture content may be produced because of savings in transportation and merchandising costs related to reduced volume and weight. These products with their greater concentration of milk solids, are useful in manufacture of ice-cream, candies and other food items. Sweetened condensed milk may be made either from whole milk or from skim milk by concentrating milk to about one-third volume by the removal of water and addition of sugar.

Viable microorganisms are commonly found in the final product, and their numbers may vary between few microorganisms to 100,000/g (ROBINSON, 1981). The various methods of heat treatment used are not adequate to kill spore-forming bacteria, and further processing and handling usually contribute a variety of microorganisms; the sugar levels employed permit some types to grow if other conditions are favourable. Enough oxygen may be present in the head space of an incompletely filled, or poorly sealed, container to permit the growth of organisms able to tolerate the high osmotic pressure of the product.

Several outbreaks of acute gastrointestinal disturbance have been reported due to consumption of condensed milk (COCKBURAN and VERNON, 1956). Torulopsis, Aspergillus, Penicillium, Micrococci, Coliforms and spore-former may be associated with defects in condensed milk, especially if the canned products are held for longer times (ROBINSON, 1981). JARCHOVSKA *et al.* (1970) found that the total bacterial count ranged from 100/g to 50,000/g. They also isolated staphylococci, micrococci, enterococci, enterobacter and Alkaligenes faecalis while, SLUZEWSKI (1977) stated that micrococci can grow and resist the high osmotic pressure of sweetened condensed milk. In another study conducted by SALLAM (1979), the mean value of total colony, enterococci and yeast and mould counts were found to be 10.24×10^3 , 105.33 and 17.83/g respectively.

This work was planned to secure the microbiological evaluation of condensed milk.

AHMED A-H. AHMED, *et al***MATERIAL and METHODS**

32 random samples of full cream sweetened condensed milk cans (Carnation and Alaska) were collected from Assiut City markets for microbiological evaluation. Preparation and handling of collected samples were done according to standard Methods (A.P.H.A., 1978). The prepared samples were examined for the following:

Total colony count : (A.P.H.A., 1978).

Total yeast and mould count : (A.P.H.A., 1978)

Enterococci count : Enterococcus selective differential agar was used as recommended by EFTHYMIU *et al.* (1974).

Coliform count : MPN technique was carried out as described in FAO (1979).

Staph. aureus count : MPN technique was employed as described by VAN DOORNE *et al.* (1981).

B. cereus count : MPN technique was used as described by LANCETTE and HARMON (1980).

Detection of anaerobic spore-formers : The technique used is that recommended by CHALMERS (1962).

Isolation and identification of other pathogenic microorganisms was carried out according to RIPPON (1974) and FINEGOLD and MARTIN (1978).

RESULTS

The results obtained are recorded in Tables (1 & 2).

Table (1): Total colony, Enterococci and yeasts & moulds counts/g of the examined condensed milk.

	Positive Samples		Counts/g.		
	No/32	%	Min.	Max	Average
Total colony	32	100	300	110×10^3	128.4×10^2
Enterococci	15	46.9	100	32.6×10^3	45.1×10^2
Yeasts & moulds	10	31.3	10	120	66.3

DISCUSSION

Table (1) shows the maximum, minimum and average of total colony counts in the examined samples of condensed milk. According to the standard specified by the American Public Health Association, the total bacterial count/g. of sweetened condensed milk should not exceed 10,000, consequently, 12.5% of the examined samples do not comply with such standard. Similar findings were obtained by SALLAM (1979). Also, the results recorded in Table (1) revealed that 46.9% of the samples contained enterococci with varying numbers. Lower incidence of enterococci was reported by SALLAM (1979). These organisms may have a distinctive role as indicative of poor factory sanitation, owing to their relatively high resistance to drying or disinfectants (FAO, 1979). Furthermore, they constitute a public health hazard

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(SEDOVA, 1970 and ERWA, 1972). Yeasts and moulds were found in 10 samples (31.3%) with an average count of 66.3/g. of condensed milk (Table 1). these organisms could be isolated from condensed milk examined by RAO and RANGANATHAN (1970) and SALLAM (1979) who obtained a lower findings than that present in this investigation.

The results recorded in Table 2, show the incidence percentages of isolated microorganisms recovered from the examined condensed milk samples. The isolated organisms whether pathogenic or non-pathogenic thrive well in the product constituting a public health hazard as well as economic losses. The main source of contamination of condensed milk by these microorganisms may be from imperfectly cleaned machinery and incompletely sterilized tins (GARCIA, 1959). On the otherhand, Salmonella, Staph. aureus, Bacillus cereus and coliforms could not be detected in all of examined samples. ROBINSON (1981) stated that coliforms, may die off with holding, but micrococci yeast, moulds may proliferate.

Table (2): Frequency distribution of isolated strains recovered from the examined condensed milk samples.

isolates	Frequency	
	No. of isolates	%
Bacteria :		
Strept faecalis	15	30.6
Strept faecium	5	10.2
Micrococcus	4	8.2
Anaerobes	3	6.1
Moulds :		
Aspergillus sp.	7	14.3
Cladosporum sp.	5	10.2
Penicillium sp.	4	8.2
Mucor sp.	3	6.1
Alternaria	3	6.1

REFERENCES

- A.P.H.A. (1978): Standard Methods of Examination of Dairy Products. 14th Ed., American Public Health Association, Washington, D.C.
- Chalmers, C.H. (1962): Bacteria in relation to milk supply. 5th ed., Arnold LTD., London.
- Cookburan, W.C. and Vernon, E. (1956): Food poisoning in England and Wales, 1955, Food poisoning of all types. Dairy Sci. Abst. 19, 246 (1957).
- Efthymiou, C.J.; Baccash, P.; Labmbardi, V.J. and Epitein, D.S. (1974): Improved isolation and differentiation of enterococci in cheese Appl. Microbiol. 28, 3, 417-422.
- Erwa, H.E. (1972): Enterococci in diarrhea of neonates. Trans. Roy. Soc. Trop. Med. Hyg. 66: 359-361.
- FAO (1970): Manuals of food quality control. Microbiological analysis. Food and Agriculture organization of the United Nations, Rome.
- Finegold, S.M. and W.J. Martin (1982): Baily and Scott Diagnostic Microbiology. 6th ed. C.V. Mosby, Co. St. Louis. Toronto, London.

- Garcia, F.R. (1959): Microbiological control of the manufacture of condensed milk. Dairy Sci. Abs. 24, 256 (1962).
- Jarchovska, H.; Brodsky, F. and Hartmanova, J. (1970): Total microbial count of condensed sweetened milk. Prum. Potravin 21, 298. Dairy Sci. Abst. 32, 227 (1971).
- Lancette, G.A. and Harmon, S.M. (1980): Enumeration and confirmation of *Bacillus cereus* in foods. Collaborative study. J. Ass. Off. Analyt. Chem. 63, 581-586.
- Rao, V.J. and Ranganathan (1970): Studies on the microbiology of sweetened condensed milk. Indian J. Dairy Sci. 23, 205.
- Rippon, J.W. (1974): Medical mycology. 1st ed. W.B. Saunders S. Philadelphia London, Toronto.
- Robinson, R.K. (1981): Dairy microbiology. the microbiology of milk. J. Applied Science Publishers London and New Jersey.
- Sallam, S.S. El. (1979): Microbiological investigation of powdered and condensed milk. M.V.Sc. Thesis. Faculty of Vet. Med., Cairo University.
- Sedova, N.N. (1970): Potential role of enterococci in food poisoning. Cited from Dairy Sci. Abst. 32: 3854.
- Sluzewski, a.M. (1977): the detection of osmophilic micrococci in sweetened condensed milk. Dairy Sci. Abst. 39, 674.
- Van Doorne, H.; Baird, R.M. and Hendriksz, D.M. (1981): Liquid modification of Baird-Parker's medium for the selective enrichment of *Staph. aureus*. Antonie v. Leeuwenhoek 47, 267-278.

