

## BACTERIOLOGICAL QUALITY OF VANILLA AND CHOCOLATE CREAM POWDERS.

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### SUMMARY

Fifty random samples of cream powders with vanilla and chocolate flavour were collected from supermarkets in different localities in Beni-Suef and Biza cities for determination of their bacteriological quality.

The mean count of total colony count and coliforms in vanilla and chocolate cream powders/gm were  $7.8 \times 10^3$  and  $5.3 \times 10^3$  and  $5.1 \times 10^2$  and  $1.7 \times 10^2$  respectively. *Str. faecalis*, *Str. intermediate* and *Str. faecium* were detected at different percentages ranging from 12% to 44% of the examined samples. Aerobic spore formers and Anaerobes were detected in 68% & 32% and 56% & 20% of vanilla and chocolate cream powders samples respectively.

*Bacillus cereus*, *B. subtilis*, *B. stearothermophilus* and *B. coagulans* also *Clostridium perfringens*, *Cl. bifementans*, *Cl. cadaveris* and *Cl. novyi* could be isolated at varying percentages. The public health importance of existing organisms, their effect on the product as well as suggested control measures were discussed.

### INTRODUCTION

Cream powders are popular dried dairy products due to their stability, delicious and nutritious properties. These kinds of cream are frequently used as they are convenient at any time for filling

and decoration of cakes, sweets and fruits whether in the house hold, hotels or sweet shops. These types of cream powders are made by co-spray drying skimmed milk and addition of other ingredients e.g sugar, vegetable fat, emulsifiers, stabilizers and flavouring materials e.g. vanilla or chocolate.

While these of cream powders are widely used, their bacteriological status has not yet been enough tackled, specially concerning the incidence of organisms implicated in cases of gastrointestinal disturbances. Therefore, this work was accomplished to fulfill this gap.

### MATERIALS AND METHODS

A total of cream powders with vanilla and chocolate flavour (25 each) in retail packages were collected from supermarkets in different localities in Beni-Suef and Giza cities for bacteriological examination by determination the total colony and coliform counts A. P. H. A (1987). Enterococcus differential count was determined according to Efthymiou et al., (1974). Aerobic and anaerobic spore formers were detected according to the techniques recommended by ICMSF (1982).

### RESULTS AND DISCUSSION

Results given in table (1) reveal that the maximum Total Colony Count (TCC) / gm of examined cream with vanilla and chocolate flavour was  $2.4 \times 10^4$  and  $3.9 \times 10^4$ , while the minimum was  $21 \times 10^2$  and  $11 \times 10^2$  with a mean

Table 1: Statistical analytical results of bacteriological examination of cream powder.

Test	Positive		Vanilla cream powder				Positive		Vanilla cream powder			
	No.	%	Min.	Max.	Mean	± SEM	No.	%	Min.	Max.	Mean	± SEM
Total colony count (TCC)	25	100	$2.1 \times 10^2$	$2.4 \times 10^4$	$7.8 \times 10^3$	$1.8 \times 10^3$	25	100	$1.1 \times 10^2$	$3.9 \times 10^4$	$5.3 \times 10^3$	$1.5 \times 10^3$
Coliforms	10	40	$2.1 \times 10$	$1.7 \times 10^3$	$5.1 \times 10^2$	$1.2 \times 10^2$	5	20	$3.5 \times 10$	$3.1 \times 10^2$	$1.7 \times 10^2$	$0.24 \times 10^2$
a- Str. faecalis	11	44	$3.5 \times 10$	$5.4 \times 10^3$	$1.7 \times 10^3$	$0.43 \times 10^3$	7	28	$1.2 \times 10^2$	$2.1 \times 10^4$	$6.1 \times 10^3$	$1.5 \times 10^3$
b- Str. intermediat	4	16	$1.2 \times 10$	$5.6 \times 10^2$	$3.4 \times 10^2$	$1.3 \times 10^2$	3	12	$2.3 \times 10^2$	$4.4 \times 10^3$	$1.7 \times 10^3$	$1.3 \times 10^3$
c- Str. Faecium	6	24	$1.5 \times 10$	$2.1 \times 10^3$	$9.3 \times 10^2$	$3.8 \times 10^2$	5	20	$1.1 \times 10^2$	$2.1 \times 10^3$	$9.7 \times 10^2$	$3.8 \times 10^2$
Aerobic spore formers (ASF)	17	68	$1.5 \times 10^2$	$3.6 \times 10^4$	$5.1 \times 10^3$	$1.8 \times 10^3$	14	56	$1.7 \times 10$	$1.8 \times 10^3$	$4.3 \times 10^2$	$1.1 \times 10^2$
Anaerobic spore formers	8	32	$3.2 \times 10$	$1.8 \times 10^3$	$4.5 \times 10^2$	$1.3 \times 10^2$	5	20	$5.5 \times 10$	$2.5 \times 10^2$	$1.2 \times 10^2$	$0.17 \times 10^2$

value of  $7.8 \times 10^3 \pm 1.8 \times 10^3$  and  $5.3 \times 10^3 \pm 1.5 \times 10^3$  respectively. The highest frequency distribution (68% and 52%) lies within the range  $10^2 - 10^4$  and  $10^2 - 10^3$  respectively Table (2).

Inspection of Table (1) indicates that 04% of vanilla cream and 20% of chocolate cream samples contained coliforms with a mean count / mg of  $5.1 \times 10^2 \pm 1.2 \times 10^2$  and  $1.7 \times 10^2 \pm 0.24 \times 10^2$  respectively. The highest frequency

distribution (70% and 60%) ranged from  $10^2 - 10^3$  and  $10^2 - 10^3$  respectively, Table (2).

Presence of coliforms indicative of neglected sanitary measures during production, processing and handling of the product, besides they may times constitute a public health hazard (Pyatkin Martine, 1982).

It is evident from table (1) that the mean count

Table (2): Frequency distribution of examined samples based on total colony and coliforms counts.

Rafige	Vanilla cream				Chocolate cream			
	Total colony count		Coliforms		Total colony count		Coliforms	
	No.	%	No.	%	No.	%	No.	%
$10^2 - 10^2$	..	..	3	30	..	..	2	40
$10^3 - 10^3$	9	36	4	40	13	52	3	60
$10^3 - 10^4$	8	32	3	30	8	32	..	..
$10^4 - 10^5$	8	32	..	..	4	16	..	..
Total	25	100	10	100	25	100	5	100

of *Str. faecalis*, *Str. intermediate* and *str. faecium* in the vanilla cream were  $1.7 \times 10^3 \pm 0.43 \times 10^3$ ,  $3.4 \times 10^2 \pm 1.3 \times 10^2$  and  $9.3 \times 10^2 \pm 3.8 \times 10^2$  respectively while in chocolate flavoured samples were  $6.1 \times 10^2 \pm 1.5 \times 10^3$ ,  $1.7 \times 10^3 \pm 1.3 \times 10^3$  and  $9.7 \times 10^2 \pm 3.8 \times 10^2$  respectively. As Enterococci can grow under a wide range of temperature and because of their relative high resistance to drying, they may survive in cream with possible production of undesirable changes affecting keeping quality of the product. Some of enterococci being also associated with food borne illness (Sedova et al., 1981; Colman and Ball, 1984 and Cantoni & Bersani, 1988).

Presence of ASF in cream powder samples depends on their initial load in raw milk, certain additives, heat treatment as well as the extent of post processing contamination. These organisms proved to induce certain objectionable changes in milk and some dairy products, while some strains have been implicated in cases of food poisoning (Frazier & Westhoff, 1983; Pendurkar & Kulkarni, 1989; Farkas, 1990; Griffiths, 1990 and Stanley & Donald, 1991).

Anaerobic spore forming organisms were detected in 8 samples of vanilla cream and 5 samples of chocolate cream powders with a mean value of  $4.5 \times 10^2 \pm 1.3 \times 10^2$  and  $1.2 \times 10^2 \pm 0.17 \times 10^2/g$

Table (3): Frequency distribution of examined samples based on aerobic and anaerobic spore formers counts.

Range	Vanilla cream				Chocolate cream			
	Aerobic spore formers		Anaerobic spore formers		Aerobic spore formers		Anaerobic spore formers	
	No.	%	No.	%	No.	%	No.	%
10 - 10 <sup>2</sup>	2	11.76	4	50	4	28.57	3	60
10 <sup>2</sup> - 10 <sup>3</sup>	7	41.18	2	25	8	57.84	2	40
10 <sup>3</sup> - 10 <sup>4</sup>	4	23.53	2	25	2	14.29	--	--
10 <sup>4</sup> - 10 <sup>5</sup>	4	23.53	--	--	--	--	--	--
Total	17	100.00	100	100	14	100.00	5	100

Inspection of Table (1) reveals that 68% and 56% of vanilla and chocolate cream samples contained Aerobic spore formers (ASF) with a mean value of  $5.1 \times 10^3 \pm 1.8 \times 10^3$  and  $4.3 \times 10^3 \pm 1.1 \times 10^2/g$  respectively. The highest frequency distribution (64.71% and 57.84%) lies within the range 10<sup>2</sup> - 10<sup>4</sup> and 10<sup>2</sup> - 10<sup>3</sup> respectively table (3).

Results presented in table (4) show that *Bacillus cereus* could be isolated from 22% of examined samples while *B. subtilis*; *B. stearo-thermophilus* and *B. coagulans* could be isolated from varying percentages 26%, 14% and 6% samples respectively.

respectively. The highest frequency distribution of examined samples (50% and 60%) lies within the range 10-10<sup>2</sup> Table (3).

It is evident from table (4) that *Clostridium perfringens*, *Cl. bifermentans*, *Cl. cadaveris* and *Cl. novyi* could be isolated at varying percentages ranging from 4% to 18%. Some strains of clostridia are saccharolytic, others are proteolytic and most of them are also gas formers. Moreover, certain strains have been implicated in cases of food poisoning (ICMSF, 1982; Frazier and Westhoff, 1983; Larson and Borriello, 1988; Farkas 1990 and Granum, 1990).

Table (4): Incidence of isolated spore formers from vanilla and chocolate cream powder samples.

Isolates	Positive samples	
	No.	%
<b>Aerobic spore formers:</b>		
• <i>B. Cereus</i>	11	22
• <i>B. Subtilis</i>	13	26
• <i>B. Stearothermophilus</i>	7	14
• <i>B. Coagulans</i>	3	6
<b>Anaerobic spore formers:</b>		
• <i>Cl. perfringens</i>	7	14
• <i>Cl. bifementans</i>	9	18
• <i>Cl. cadaveris</i>	6	12
• <i>Cl. novyi</i>	2	4

Realizing that cream powder products do not receive sufficient heat treatment during their preparation, contaminants whether pathogenic or deteriorating organisms may find their way into the products constituting a public health hazard and/or economic loss.

The results achieved allow to conclude that most of examined cream powder samples have been processed and packaged under neglected hygienic measures. Therefore best quality ingredients and satisfactory hygienic measures during production and packaging should be adopted to improve the quality of the products and to safeguard the consumer against the risk of food poisoning.

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