

BACTERIOLOGICAL EVALUATION OF RAW MILK SOLD IN MANSOURA

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ABSTRACT

A total of 250 random raw milk samples were collected from different groceries and supermarkets in Mansoura City, El-Dakhalla Governorate. The samples were evaluated bacteriologically after organoleptic and chemical preservatives were tested.

*The bacteriological examination revealed that the mean values for counts of true faecal type *E. coli*, *Staph. aureus* and *Bacillus cereus* were 4×10^4 , 6×10^4 and 3.8×10^2 cfu/ml respectively. Their incidence were 40, 50 and 40% of samples respectively. The results revealed that 60, 50 and 60% of samples showed faecal type *E. coli*, *Staph. aureus* and *Bacillus cereus* contents with agreement of Egyptian standard.*

The recommendation for prevention and minimizing the bacteriological contamination of milk were discussed.

INTRODUCTION

Milk is most unique and ideal food for human. FAO (1992) stated that food safety and quality start at the farm and continue throughout the processing and distribution chain to storage and final preparation by the consumer or food service industry.

Milk and milk products are main constituents of the daily diet especially for infants, school-age children and old age (Davies et al. 1986) due to its contents of high quality animal protein.

Milk ranks high among other food because its nutrients easily consumable and easily assimilable (Al-Ashmawy et al. 2001).

The interval between milking to consuming or manufacturing of milk is subjected to microbial contamination from many sources (dairy equipment, water, soil, animal coat and milk handler) (Hayes et al. 2001).

The presence of *E. coli* true faecal type as enteropathogenic indicates direct or indirect faecal pollution and reflects the unsatisfactory hygienic conditions during milking and handling. (ICMSF, 1978).

Staphylococcus food intoxication is most commonly occurring all over the world as the organism is wide-spread in nature and hence the rate of direct or indirect food contamination is high (Caaman, 1967). Food borne outbreaks of *Staphylococcus* intoxication traced

to consumption of contaminated milk were recorded by **Kerro-Dego et al. 2002**.

Bacillus cereus growth spoils the quality of dairy products causing sweet curdling and bitter cream (**Davies and Wilkinson, 1973**). *Bacillus cereus* is considered one of most food intoxication micro-organisms due to its ability to produce a heat-labile diarrheal enterotoxin and /or a heat-stable emetic enterotoxin (**Granum, 1994**).

Quality control techniques are employed to ensure that the food processes are effective and prevent potential serious health problems. Therefore, the present study was done to evaluate the microbial conditions of raw milk in Mansoura city, El-Dakhliya governorate.

MATERIAL AND METHODS

A total of 250 random samples of raw milk were collected from supermarkets and groceries in Mansoura City, El-Dakhliya Province. The samples were of normal organoleptic characters (colour, odour, taste). They transferred directly in an ice box to the laboratory. The sample were tested for heat treatment by Storch test according to (**Lampert, 1975**), for presence of inhibitors according to (**Al-Ashmawy, 1990**) and for presence of preservatives according to (**Ling, 1969 and Ather-ton and New-Lander, 1977**). The samples which were positive for these tests were excluded from the study and negative milk samples were tested for assessment of bacteriological quality of raw milk as the following:

1- Preparation of serial dilution of milk samples were done according to

(**APHA, 1992**).

- 2- True faecal *E.coli* count according to (ISO, 4832): One ml from the appropriate dilutions were inoculated into 10 ml of MacConkey broth tubes provided with Durham's tubes. The tubes were kept in water bath adjusted at 44.5°C for at least 48 hrs. Tubes showing acid and gas were considered positive for faecal coliform.
- 3- *Staph-aureus* count according to (**ICMSF, 1982**): 0.1ml of previously prepared dilution was transferred to plates of well-dried Mannitol salt agar medium. Spread the inoculums over the surface with sterile bent glass-rod. Incubate for 24 h at 37°C. Only typical *Staph.aureus* appear yellow in colour, other strains appear orange.
- 4- *Bacillus cereus* count according to (**APHA, 1992**) : 0.1ml of examined milk samples was spread on the surface of highly specific and sensitive mannitol-egg yolk-polymyxin agar medium (MYP) and incubated at 30°C for 24hrs. Suspected colonies were large, crenated, pink
- 5- Identification of isolated organisms was done according to (**Harrigan 1998**).

RESULTS & DISCUSSION

True faecal *E.coli* is one of the important food-borne pathogens that are widely distributed all over the world. Presence of true faecal *E.coli* in raw milk indicated faecal contamination which lead to inferior quality of milk, public health hazard and severe food poisoning outbreaks (**Condera et al. 2004**).

True fecal *E.coli* found in 40% (100/250 samples) of examined samples (Table 1). They ranged from 10^4 - 2.8×10^5 cfu/ml with an average $4 \times 10^4 \pm 2.8 \times 10^4$ (Table 1). According to Egyptian standards (2005), 40% of samples exceeded the permissible levels.(Table 2).

Higher results were obtained by **Moustafa et al. (1988)**. They isolated true fecal *E.coli* from 66.6% of samples. Also, Lower results were obtained by **El-Essawy and Riad (1989)** as they isolated true fecal *E.coli* from 10% of collected samples. True fecal *E.coli* was used as an indicator of fecal contamination.

Staphylococcal food borne diseases caused by the ingestion of one or more toxins are one of the most common causes of food intoxication (**Bunning et al.1997**).

Staphylococcus aureus was isolated from 50% (125/250 samples)in examined samples in the range of 1.2×10^4 - 2.4×10^5 cfu/ml. The mean value of *Staph. aureus* was $6 \times 10^4 \pm 3 \times 10^4$ (Table 1). According to Egyptian standards (2005), 50% of samples exceed the permissible levels (Table 2).

High numbers of *Staph aureus* produce a public health hazard due to their enterotoxin production.European legislation stipulates the obligation of enteotoxin detection if *Staph.aureus* is detected over 10^5 cfu/ml (**Meyrand et al. 1998**).

Lower results was obtained by **Abdel-Hamid and El-Mait (2009)** who isolated *staph. aureus* from 24% of examined samples.

Bacillus cereus is an aerobic spore forming microorganism found in soil,ground water and often found on plants and animals at the point of harvest or slaughter.

Bacillus cereus found in 40% (100/250) of samples. They ranged from 3×10^2 - 1.2×10^3 cfu/ml with a mean value of 3.8×10^2 cfu/ml with a mean value of $3.8 \times 10^2 \pm 1.6 \times 10^2$ (Table 1). According to the **Egyptian Standards (2005)**, about 40% of samples exceed the recommended limits (Table 2).

Lower results were obtained by **Sallam et al. (1991)** who could isolate *B.cereus* from 35% of samples with a mean count $2.19 \times 10^3 \pm 1.4 \times 10^3$ /ml. Higher results was obtained by **Wahba (1997)** as they isolated *B.cereus* from 54.3% of samples.

The infective dose of *Bacillus cereus* is 10^6 - 10^8 cells/ml (**Mossel, 1982**). Infection of human by *Bacillus cereus* may be complicated by bronchopneumonia and otitis (**Lazar and Tursack,1966**).

From forgoing discussion,it is clear that the most of raw milk samples were contaminated microbiologically.

Therefore, some suggestion must be put in consideration in order to improve milk quality:

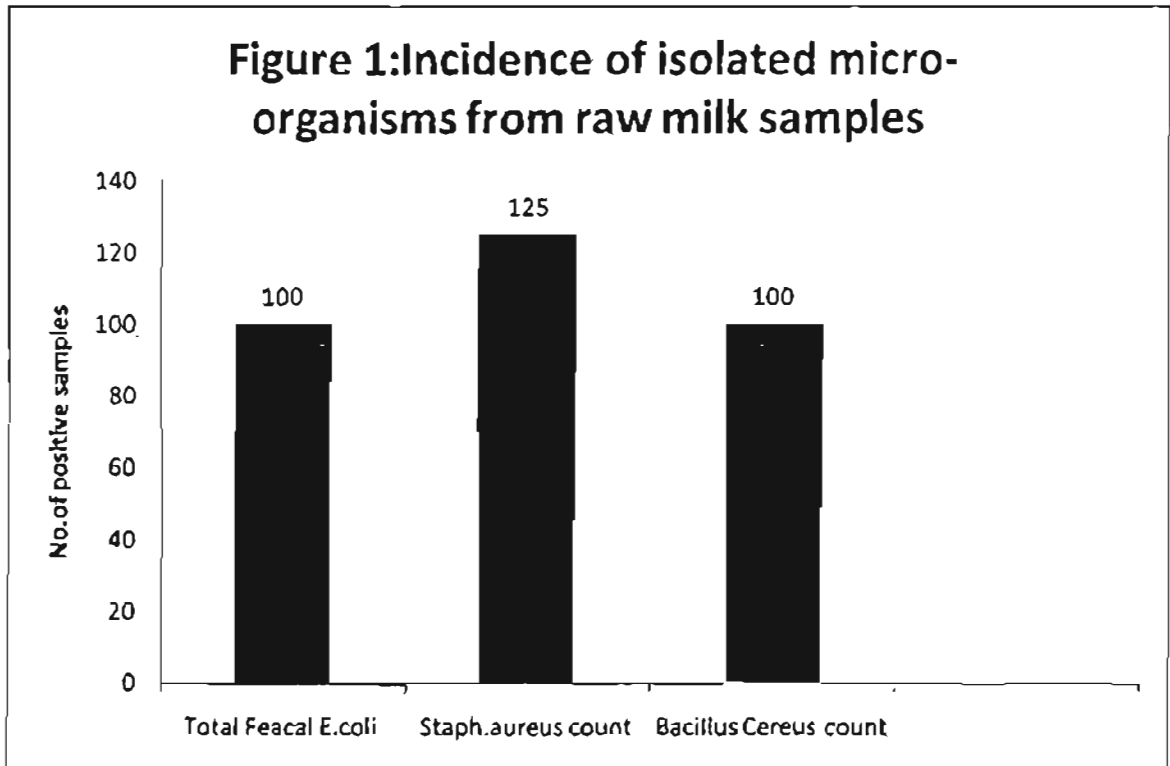
- 1- Raw milk should be produced from healthy animals.
- 2- Raw milk should be obtained under strict hygienic measurements.
- 3- Personal hygiene must be considered to prevent the contamination of milk.

Table 1: Statistical Analytical Results of Microbiological Examination Of Raw Milk Samples.

Parameter	No. of examined sample	No. of +ve samples	Minimum	Maximum	Mean±S.E
Total Faecal E.coli count	250	100	1×10^4	2.8×10^5	$4 \times 10^4 \pm 2.8 \times 10^4$
Staph.aureus count	250	125	1.2×10^4	2.4×10^5	$6 \times 10^4 \pm 3 \times 10^4$
Bacillus Cereus count	250	100	3×10^2	1.2×10^3	$3.8 \times 10^2 \pm 1.8 \times 10^2$

Table 2 : The Bacterial Results of Raw Milk Samples Compared with Egyptian Standards 2005

Parameter	No. of examined samples	Acceptable		Un-acceptable	
		No.	%	No.	%
True Feacal E.coli count	250	free from E.coli		presence of E.coli	
		No.	%	No.	%
		150	60	100	40
Staph.aureus count	250	<100		>100	
		No.	%	No.	%
		125	50	125	50
Bacillus cereus count	250	<1		>1	
		No.	%	No.	%
		150	60	100	40



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الملخص العربى

التقييم البكتيريولوجى لللبن الخام المباع فى المنصورة

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اجريت الدراسة على 250 عينة من اللبن الخام تم تجميعها من اماكن متفرقة من مدينة المنصورة-محافظة الدقهلية. تم فحص العينات ظاهريا للكشف عن تواجد المواد الحافظة و استبعدت العينات الايجابية من الدراسة. ولقد اوضحت الدراسة البكتيريولوجية ان متوسط عد الايشيريشيا القولونية والميكروب العنقودى الذهبى و الباسيلس سيرس كانت على التوالى 4×10^4 و 6×10^4 و 3.8×10^2 خلية/مللى اما نسبة تواجد الميكروبات فى العينات فكانت 40 و 50 و 40% على التوالى. و بمقارنة هذه النتائج بالموصفات القياسية المصرية فوجد ان 60% و 50% و 60% تتطابق مع المواصفات القياسية المصرية من حيث عدد الايشيريشيا القولونية و المكور العنقودى الذهبى و الباسيلس سيرس على التوالى. هذا و قد تم مناقشة الاهمية الصحية للميكروبات المعزولة و كذلك المقترحات اللازمة لتقليل او منع تلوث اللبن الخام لضمان اقصى درجات الامان للمستهلك.