The Iraqi J. Vet. Med. 12 (1988)

THE QUALITY OF MILK PRODUCED IN "FADHILIA VILLAGE" NEAR BAGHDAD IN IRAQ

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SUMMARY

A study on the quality of milk produced in "Fadhilia Village" near Baghdad extending over a period of one year, revealed that the total bacterial and coliform counts for milk samples from individual producers were $7.4x10^5$ and $2.5x10^3$ in summer, and $1.8x10^5$ and $5.4x10^2$ in winter respectively. The above counts for bulk milk samples were $3.3x10^6$ and $1.8x10^4$ in summer and $5.1x10^5$ and $3.3x10^3$ in winter respectively. All over the year the preliminary incubation and psychrotrophic counts for both individual and bulk milk samples were strictly higher than all the proposed standards. There was a significant drop in methylene blue reduction time in summer samples compared to winter samples. A similar drop was noticed in bulk tank samples as compared to individual producer samples. Besides that a significant increase in lactic acid content in summer samples compared to winter samples.

INTRODUCTION

Milk is an excellent growth medium for all common spoilage organisms. Fresh, raw milk contains an initial natural microflora at the time of collection, but additional microbial numbers depending upon the care employed in milking, cleaning and handling of milk utensils is reported (Henderson, 1971). Consequently, knowledge of the microbiology of milk is of importance in the development of satisfactory methods to prevent or retard wastage of milk due to spoilage of the most valuable nutrients.

To produce milk of good keeping quality and valuable for human consumption the following points should be fulfilled: 1) Clean animals; 2) Clean and properly sanitized and maintained milk handling equipments; 3) prompt and efficient cooling of the milk.

Galton *et al.*, (1984) reported that methods resulting in lowest bacterial counts were the use of water hose, wet towel, or premilking disinfectant teat dip followed by drying with paper towels. Besides that, physical manipulation of teats during cleaning was essential for lowering sediment in milk (Galton *et al.*, 1982). A high bacterial count of milk in Iraq suggests the use of improperly cleaned and sanitized equipments and careless handling practices (AL-Zubaidi, 1985).

The main objective of this study was to determine the sanitary quality of raw milk in Fadhilia village - near Baghdad city, which is considered one of the major supplier of milk to Baghdad's dairy plant.

MATERIALS AND METHODS

Milk Samples

Sixty raw milk samples of 600 ml each were collected from individual producers cans and bulk tanks of Fadhilia center for the reception of milk. The samples were processed according to Marth (1978).

Microbial Analysis

Testing of samples were started within 36 hours after collection. 500 ml of each samples was used for the sediment, acidity and methylene blue reduction tests. The rests were analysed for Standard Plate Count (SPC), Coliform Plate Count (CPC), Psychrotrophic Plate Count (PPC) and Preliminary Incubation Count (PIC) according to Marth (1978) and Diliello (1982).

Statistical Procedures

The results of chemical and microbiological determination were analyzed by the Analysis of Variance (ANOVA) technique with nested treatment arrangement. Least significant difference (LSD) test was used to determine if significant differences existed among sources of variation (Snedecor and Cochran, 1968).

RESULTS AND DISCUSSION

The SPC has been used as primary cultural method for examining fluid milk. It is specified for Grade A Pasteurized milk ordinance and considered as the only official cultural method to determine the total aerobic counts (Marth, 1978). However, the SPC does not show how many bacteria may be present that could grow at refrigeration temperatures. Therefore, many industrial laboratories apply additional tests to evaluate the

quality of raw milk. These tests include, Preliminary Incubation Count (PIC), Psychrotrophic Plate Count (PPC) and Coliform Plate Count (CPC) (Speck, 1976).

Table 1, shows the arithmetic means obtained from SPC, PIC, PPC and CPC. These profiles revealed that all bacterial counts were significantly lower ($P<0.01$) in winter than in summer. The decline of these bacterial counts during the winter could be related to the retardation effect of cooling on the growth and metabolic activity of spoilage bacteria.

In this study the result of SPC was more than $1x10^5$ CFU/ml. The standard that was mentioned by Marth (1978) for raw milk was less or equal to $1x10^5$ CFU/ml. On the other hand, Diliello (1982) mentioned that the standard measurements of the raw milk for the SPC and CPC should not be more than $4x10^5$ and $1.5x10^2$ CFU/ml respectively. In addition, all the bacterial counts in the milk of bulk tank were significantly higher ($P<0.001$) than those of individual producers (Table 2).

As shown in Tables 1 and 2, the Preliminary Incubation Counts were strictly higher than all the standards proposed by Johns (1975) who concluded that any count greater than $3x10^5$ CFU/ml indicates severe psychrotrophic problems in raw milk.

Campbell and Marshall (1975) reported that many saprophytic contaminants can grow actively at 12.8 °C, thus, a high count after preliminary incubation suggests the use of bad and careless handling practices.

Law *et al.*, (1979) claimed that a "true" psychrotrophic count can be obtained by incubating the plates at 7 °C for 10 days.

Data appeared in Table 2 demonstrate that milk from bulk tank had significantly higher ($P<0.05$)

Table 1
Microbiological profile of fresh raw milk at different seasons

Source of Samples	Season	No. of samples	Plating Procedure: Arithmetic Means CFU/ml. SPC	PIC	CPC	PPC
Individual Producer	Winter	15	1.8×10^{5} A'	2.2×10^{6} A'	5.4×10^{2} A'	3.5×10^{4} A'
	Summer	15	7.4×10^{5} B	1.4×10^{7} BC	2.5×10^{3} B	2.1×10^{5} BC
Bulk Tank	Winter	15	5.1×10^{5} B	1.1×10^{7} C	3.3×10^{3} B	1×10^{6} C
	Summer	15	3.3×10^{7} C	2.3×10^{7} B	1.8×10^{4} C	3.5×10^{5} B

means in a column not followed by the same letter differ significantly ($P<0.01$).

Table 2
Microbiological profile of fresh raw milk received from different sources

Source of samples	No. of samples	Plating Procedure: Arithmetic Means CFU/ml. SPC	PIC	CPC	PPC
Individual producer	30	3.6×10^{5} ***	5.7×10^{6} **	1.15×10^{3} *	8.7×10^{4}
Bulk tank	30	1.2×10^{6}	1.6×10^{7}	7.6×10^{3}	1.9×10^{5}

* Significant ($P<0.05$)

** Very Significant ($P<0.01$)

*** Highly Significant ($P<0.001$)

psychrotrophic bacterial count than that of individual producer.

Table 1 shows also a significant increase ($P<0.01$) in psychrotrophic bacteria which was obtained due to the temperature variation. The number of psychrotrophic bacteria in raw milk depend upon sanitary condition prevailing during production and upon time and temperature of milk storage before processing (Vedamuth *et al.*, 1978).

Results appeared in Table 3 demonstrate that milk from individual producer had significantly lower ($P<0.05$) acidity values than the bulk milk. Besides, a significant increase ($P<0.05$) in acidity value was observed in summer than winter milk. These increases in the milk acidity may be related to the large bacterial population that was found in this study in summer time. Our results were in agreement with those of Clunie Harvey and Hill (1967).

Data in Table 3 shows a significant drop ($P<0.01$) in methylene blue reduction time in summer samples compared to winter samples. A similar drop was noticed in bulk tank samples as compared to individual producer samples.

Upon statistical examination of sediment content, revealed non significant ($P>0.05$) difference in sediment content between season and farm (Table 3). Although sediment content did not differ significantly between milk from bulk tank and individual producer, milk from bulk tank showed a relatively higher sediment content value than that from individual producer. Sediment is the insoluble portion of foreign material that may get into milk from animals, equipment, or the environment. Most extraneous material that enters milk however, is soluble and does not appear as sediment (Campbell and Marshall, 1975). American Public Health Association (1972) reported

Table 3

Effect of season and source of samples on acidity, sediment and methylene blue reduction of milk

Source of samples	Season	No. of samples	Kind of test: TA % Acidity %		MBRT Hours		Sediment mg/1/2 liter milk	
Individual Procedure	Winter	15	0.198	A[1]	4	A[2]	0.591	A[3]
	Summer	15	0.206	BC	3	B	0.598	A
Bulk Tank	Winter	15	0.205	B	3	B	0.645	A
	Summer	15	0.208	C	2	C	0.699	A

1 Means in a column not followed by the same letter differ significantly (P<0.05).

2 Means in a column not followed by the same letter differ significantly (P<0.01).

3 Not significant (P>0.05).

that sediment in the raw milk should be less than 0.075 mg/1/2 liter while the results of this study revealed noticeable increase in the sediment.

Laboratory tests serve as a valuable test in improving milk quality and correcting sanitation failures. Fadhilia inspections revealed that, producer with a history of two successive high bacterial counts used a dirty equipment in their milking system and satisfactory cleaning was not being accomplished.

The data obtained in this study suggests that the tests used are reliable indicators for the sanitary measurements to be required for examining the raw milk.

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المصادر العربية

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عماد جاسم جواد الزبيدي (١٩٨٥) بعض الصفات النوعية للحليب الخام المستلم في مصنع البان البصرة، رسالة ماجستير - جامعة البصرة.

دراسة نوعية الحليب المنتج في قرية الفضلية والقريبة من بغداد في العراق

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الخلاصة

في محاولة لتسليط الضوء على نوعية الحليب المنتج في قرية الفضلية والقريبة من بغداد (احدى اكبر مصادر الحليب الخام)

درس تاثير التغيرات الحرارية خلال فصول السنة وتاثير طريقة خزن الحليب (في دبات المجهزين او حوض التجميع في مركز تجميع الحليب) على بعض الصفات المايكروبيولوجية للحليب الخام.

اوضحت نتائج الدراسة بان العدد الحرشومي الكلي وعدد بكتريا القولون لنماذج الحليب المأخوذة من دبات المجهزين (حليب المنتج الواحد) كان ٤ر٧×١٠^٥ و ٢ر٢×١٠^٣ في فصل الصيف و ٨ر١×١٠^٥ و ٤ر٥×١٠^٢ في فصل الشتاء على التوالي. اما الاعداد الحرشومية السابقة الذكر لنماذج الحليب المأخوذة من حوض التجميع (اكثر من منتج) كانت ٣ر٣×١٠^٦ و ٨ر١×١٠^٤ في فصل الصيف و ١ر٥×١٠^٥ و ٣ر٣×١٠^٣ في فصل الشتاء على التوالي.

كانت اعداد البكتريا المحبة للبرودة في كل من الحليب المخزون في حوض التجميع او دبات المجهزين في كل من الصيف والشتاء هي اعلى بكثير عن الاعداد القياسية المقترحة. ظهرت اختلافات واضحة في زمن اختزال المثيلين الازرق وذلك بقصر زمن الاختزال في حليب الصيف عن حليب الشتاء وفي الحليب المخزون في حوض التجميع عن حليب الدبات. بالاضافة الى ذلك تبين نتائج اختبار حموضة التسحيح ان حموضة حليب الصيف اكثر من حموضة حليب الشتاء.