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 $7.4 \times 10^5$ and $2.5 \times 10^3$ in summer, and $1.8 \times 10^6$
and $5.4 \times 10^2$ in winter respectively. The above counts for
bulk milk samples were $3.3 \times 10^6$ and $1.8 \times 10^4$ in summer and
$5.1 \times 10^3$ and $3.3 \times 10^3$ 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 1.5x10^6 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

**Plating Procedure**

<table>
<thead>
<tr>
<th>Source of Samples</th>
<th>No. of samples</th>
<th>SPC</th>
<th>PIC</th>
<th>CPC</th>
<th>PFC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>Winter</td>
<td>15</td>
<td>1.8x10^8A'</td>
<td>2.2x10^8A'</td>
<td>5.4x10^8A'</td>
</tr>
<tr>
<td>Producer</td>
<td>Summer</td>
<td>15</td>
<td>7.4x10^8B</td>
<td>1.4x10^8BC</td>
<td>2.5x10^8B</td>
</tr>
<tr>
<td>Bulk</td>
<td>Winter</td>
<td>15</td>
<td>5.1x10^8B</td>
<td>1.1x10^8C</td>
<td>3.3x10^8B</td>
</tr>
<tr>
<td>Tank</td>
<td>Summer</td>
<td>15</td>
<td>3.3x10^7C</td>
<td>2.3x10^7B</td>
<td>1.8x10^4C</td>
</tr>
</tbody>
</table>

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

**Plating Procedure**

<table>
<thead>
<tr>
<th>Source of samples</th>
<th>No. of samples</th>
<th>SPC</th>
<th>PIC</th>
<th>CPC</th>
<th>PFC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual</td>
<td>30</td>
<td>3.6x10^8 ***</td>
<td>5.7x10^8 **</td>
<td>1.15x10^9 ***</td>
<td>8.7x10^4</td>
</tr>
<tr>
<td>producer</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bulk</td>
<td>30</td>
<td>1.2x10^6</td>
<td>1.6x10^7</td>
<td>7.6x10^3</td>
<td>1.9x10^5</td>
</tr>
<tr>
<td>tank</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* 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

<table>
<thead>
<tr>
<th>Kind of test</th>
<th>Source of samples</th>
<th>Season</th>
<th>No. of samples</th>
<th>TA %</th>
<th>MBRT</th>
<th>Sediment mg/1/2 liter milk</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Individual</td>
<td>Winter</td>
<td>15</td>
<td>0.198</td>
<td>A¹</td>
<td>4 A²</td>
</tr>
<tr>
<td></td>
<td>Procedure</td>
<td>Summer</td>
<td>15</td>
<td>0.206 BC</td>
<td>3 B</td>
<td>0.598 A</td>
</tr>
<tr>
<td></td>
<td>Milk</td>
<td>Winter</td>
<td>15</td>
<td>0.205 B</td>
<td>3 B</td>
<td>0.645 A</td>
</tr>
<tr>
<td></td>
<td>Tank</td>
<td>Summer</td>
<td>15</td>
<td>0.208 C</td>
<td>2 C</td>
<td>0.699 A</td>
</tr>
</tbody>
</table>

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.
REFERENCES


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

نجم هادي نجم، عباس محمد العزاوي و حكمت صاحب الناصر، فرع الصحة العامة، كلية الطب البيطري، جامعة بغداد.

الخلاصة

في محاولة لتشمل الموضوع على نوعية الحليب المنتج في قرية الفضلية والقرية من بغداد (أحدى أكبر مصادر الحليب الخام).
درس تأثير التغيرات الحرارية ح Raum تحافز فصول السنة وتأثير طرديد الحليب في ذروة حمض الحليب (في دباد المحمزين أو حوض التجميع في مركز تجميد الحليب،) على سع الشفاء الميكروسكوبية للحليب الخام.

أوضحت نتائج الدراسة بأن عدد الجراثيم الكلي وعدد سكتريا الفولين لتمايز الحليب المعزود من دباد المحمزين (حليب المنتج الواحد) كان 5.72 x 10^6 و 4.2 x 10^5 في فصل الصيف و 8.94 x 10^6 و 2.9 x 10^3 في فصل الشتاء. على التوالي، اما الإعداد الجرثومية السائدة في ذروة حمض الحليب المعزود من حوض التجميع (أكثر من منشأ) كانت 3.63 x 10^6 و 5.8 x 10^5 في فصل الصيف و 1.3 x 10^6 و 3.3 x 10^4 في فصل الشتاء.

كانت الإعداد ماكسيما الحيبة المجردة في كل من الحليب المحزون في حوض التجميع أم دباد المحمزين في كل من الصيف والشتاء هي أعلى بكثير من الإعداد القياسية المفترضة. ظهرت اختلافات واضحة في زمن اختزال المشيئس الأزرق وذلك بقصر زمن الاحترار في حليب الصيف حسب الشتاء وفي الحليب المحزون في حوض التجميع عن حليب الدبس. بالإضافة إلى ذلك تبين نتائج اختبار حموضة التسجيل أن حموضة حليب الصيف أكثر من حموضة حليب الشتاء.

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