HYGIENE CONTROL OF MILK DISPENSERS

W.O.II D. J. PETERSON,

D. M. BRUCE, Senior Scientific Assistant
Department of Army Health, Royal Army Medical College

Introduction

Service canteens and clubs are now being equipped with cold milk dispensers of the “Whirlcool” type. As the hygienic maintenance of these machines raises many problems their supervision must be included as part of the routine hygiene inspections of such establishments.

Lloyd (1964) observed that checks on the satisfactory maintenance of milk dispensers were at present based on visual inspection only and that a form of laboratory control should be introduced. Letham (1956) stated “an official laboratory service is as necessary for the improvement of hygiene as it is for the prevention of adulteration or the maintenance of standards of composition”. He also pointed out that physical, chemical and bacteriological examination are of little value unless followed by advisory visits to discover the cause of failure and to suggest the remedy.

Following a request from the Health Inspector, London District, it was decided that a preliminary evaluation of the method described by Lloyd (1964), consisting of psychrophilic counts and a modification of the statutory methylene blue test, would be made by the Department of Army Health, Royal Army Medical College.

Psychrophiles are described by Barber (1962) as those bacterial species which are capable of relatively rapid growth at low temperatures, generally within the range 1.7°—10°C (35°—50°F), such organisms being largely Gram-negative, non-spore-forming rods with varying degrees of proteolytic activity. They are invariably present in all raw milk supplies and, like the coliforms, thermodurics and thermophiles, a part of the normal flora of raw milk. The psychrophiles are not regarded as being able to survive proper pasteurisation and therefore their presence in pasteurised milk may be considered an indication of post-pasteurisation contamination. As properly pasteurised milk is relatively free from lactic-acid producing organisms, both spore-forming bacteria and the Gram-negative psychrophiles will multiply rapidly due to the absence of this acid.

Sampling

A total of six sites supplied from four sources were visited at weekly intervals, each on the same day. Samples were collected direct from the dispensers into sterile 100 ml. screw-capped bottles and transported to the laboratory in insulated containers as soon as possible after collection.

At the time of sampling the fullest possible information was collected on the use of each dispenser. This information was tabulated under various headings, the more important being:-

(a) Designation of milk.
(b) How stored before use in dispenser.
Whether delivered in bottle or churn.

If churn—method of transfer to dispenser.

Visual inspection of dispenser contents and site.

Daily quantity of milk served from dispenser.

Disposal of stale milk.

Frequency and time of cleaning.

Method of cleaning and sterilising agent used.

Was the cleaning the responsibility of more than one person.

Name of dairy supplying milk.

(It should be emphasised that this information should be obtained on each visit as conflicting reports were received from several sites on different occasions).

Method of Laboratory Investigations

Psychrophilic Count

On arrival at the laboratory plate counts were set up by the standard technique using 1/100 and 1/1,000 dilutions of the samples and milk agar (Oxoid CM 21). Inoculated plates were incubated at 5°C for seven days and the number of colonies counted.

Methylene Blue Test

Apparatus and reagent used were as laid down in The Milk (Special Designation) Regulations 1963.

The samples were held at room temperature for seven hours prior to tubing into sterile tubes in 10 ml. quantities. These tubes were placed in an ice cold water bath and stored in the refrigerator overnight.

The following morning the tubes were heated at 37°C. for 5 minutes, 1 ml. of methylene blue added and incubation continued for a further 30 minutes. Samples which decolourised in half an hour were considered to have failed the test.

Results

Findings are tabulated in Table I.

Discussion

The method was considered satisfactory for use in Service laboratories investigating the hygiene of milk from dispensers. The categories used by Lloyd (1964) are not recommended. From our findings the following classification of dispenser hygiene in the United Kingdom is suggested:-

1. "Good". Passed methylene blue test with a psychrophilic count of less than 10,000 ml.
2. "Fair". Passed methylene blue test with count of more than 10,000 ml. but less than 25,000 ml.
3. "Unsatisfactory". Passed methylene blue test with count of more than 25,000 ml.
4. "Bad". Failed methylene blue test with or without a high count.

Unsatisfactory methylene blue tests may be due to organisms other than psychrophiles. In view of the results of the investigations on milk from milk dispensers it is considered that milk decolourising methylene blue in less than 30 minutes using this modified method cannot possibly be given any classification but bad. It should also be
<table>
<thead>
<tr>
<th>Site</th>
<th>Type pack and transfer</th>
<th>Frequency and time of cleaning</th>
<th>Disposal of stale milk</th>
<th>Appearance of dispenser and contents</th>
<th>Type of steriliser</th>
<th>Psychrophilic Count—Thousands per ml.</th>
<th>Source of Milk</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>1st Visit</td>
<td>2nd Visit</td>
<td>3rd Visit</td>
</tr>
<tr>
<td>1.</td>
<td>Bottle pasteurised.</td>
<td>Nightly</td>
<td>Tea etc.</td>
<td>Fair</td>
<td>Hytox.</td>
<td>5</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td>Night but sometimes in mornings</td>
<td>Tea etc.</td>
<td>Fair</td>
<td>Hytox.</td>
<td>220</td>
<td>95</td>
<td>93</td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td>Nightly</td>
<td>Tea etc.</td>
<td>Good</td>
<td>Hytox.</td>
<td>220</td>
<td>7</td>
<td>6</td>
</tr>
<tr>
<td>4.</td>
<td></td>
<td>When empty but one person states at night.</td>
<td>Tea etc.</td>
<td>Good</td>
<td>Hytox.</td>
<td>273</td>
<td>104</td>
<td>9</td>
</tr>
<tr>
<td>5.</td>
<td>Pasteurised, alternate bottle and churn.</td>
<td>Nightly but 1 person states when empty.</td>
<td>Tea etc.</td>
<td>Good</td>
<td>Hytox.</td>
<td>148</td>
<td>50</td>
<td>91</td>
</tr>
<tr>
<td>6.</td>
<td>Pasteurised churn by jug.</td>
<td>Nightly</td>
<td>Replaced in Dispenser</td>
<td>Good</td>
<td>Hytox.</td>
<td>220</td>
<td>98</td>
<td>104</td>
</tr>
</tbody>
</table>

**Decolourised methylene blue in five minutes. Methylene blue tests on all other specimens from the six sites were satisfactory.**
observed that the only unsatisfactory methylene blue test found in the twenty two
samples examined occurred in milk containing 400,000 psychrophiles per ml. The
statement by Lloyd (1964) that an upper limit of 10,000 psychrophiles per ml is
significant when used as a criterion of dispenser hygiene, is confirmed by our findings. It is
suggested for all who adopt these techniques that a significant upper limit may have to
be ascertained for each source of supply, as conditions of handling vary, particularly
overseas.

Summary

The suitability for use in Service laboratories of the psychophilie count and a
modified methylene blue test when assessing the hygiene of milk dispensers of the
“Whirlpool” type was investigated and found satisfactory, the findings on twenty two
milks collected from six sites supplied from four different sources are described.

Acknowledgements

We wish to record our thanks to the Health Inspector (W.O. II R. Fulbrook,
R.A.M.C.) and the hygiene staff at London District for providing the samples and
compiling the relevant information included with our laboratory findings.

REFERENCES


ACADEMIC ACHIEVEMENTS

F.R.C.S.(Eng.) MAJOR K. D. ELLIS, M.B., CH.B., R.A.M.C.; MAJOR M. S. OWEN-SMITH, M.B., B.S.,
F.R.C.S.(EDIN.), M.R.C.S., L.R.C.P., R.A.M.C.
F.R.C.S.(Edin.) MAJOR K. D. ELLIS, M.B., CH.B., R.A.M.C.
M.R.C.P.(Lond.) MAJOR H. J. TEMPLER, M.R.C.S., L.R.C.P., R.A.M.C.
A. DALGLEISH, L.R.C.S., L.R.C.P., L.R.F.P.S., R.A.M.C.; MAJOR D. R. FINDLAY,
DALLAS SMITH, M.B., CH.B., M.R.C.P., R.A.M.C.