Incubation at Elevated Temperatures Reveals Phenotypic Heterogeneity and Selective Inhibition of Enteric Bacteria

Enrica Fung, George W. Chang

The Collitag™ Method

What is Most Probable Number (MPN)?

<table>
<thead>
<tr>
<th></th>
<th>Concentrated</th>
<th>Diluted</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tube 1</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Tube 2</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Tube 3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Score</td>
<td>3</td>
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</tr>
</tbody>
</table>

**Positive tubes only in concentrated tubes = Low MPN**

**Many positive tubes even in diluted tubes = High MPN**

Non-mucoid K. oxytoca has higher growth yield compared to mucoid K. oxytoca

K. oxytoca is intolerant of high temperature incubation

Mucoid strain tolerates heat better than the non-mucoid strain

High temperature incubation forces cells into a dormant (but still viable) state

INTRODUCTION

1. E. coli O157:H7, a pathogenic strain, and interfering non-fecal contaminants (Aeromonas spp., Klebsiella spp.) are two serious problems that must be dealt with when using standard methods to test for E. coli.

2. Mucoid production (exopolysaccharide or capsule) in Klebsiella warrants further investigation.

Why is there negative selection for mucous production during long-term storage?

Does E. coli interfere with chemical resistance to the bacteria? How?

Mucous production is an exopolysaccharide (EPS) that forms a biofilm, a well-organized structure of a community of bacteria attached to a solid surface and encased in an exopolysaccharide matrix.

REFERENCES


ACKNOWLEDGEMENTS

I would like to thank all members of the Chang Lab, both past and present, for their invaluable advice and assistance in the course of this project.

ABSTRACT

In this project, we attempt to solve mucous simple applied and basic microbiological problems. The applied biological aspect is to establish a temperature range (between 40° to 45°C) where E. coli can optimally grow and yield positive viable tests while inhibiting interfering, non-fecal organisms. Klebsiella oxytoca (KOTC 386) is chosen as the model interfering organism. The peculiarities of a pathogenic strain of E. coli serotype O157:H7, further highlight the need to improve our traditional E. coli testing methods and to refine our incubation temperature range. First, does it confer heat and chemical resistance to the bacteria? How? Why is there negative selection for mucous production during long-term storage?

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