A Research Note

Microbiological Quality of Non-Dairy Creamers, Fillings and Toppings

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ABSTRACT

A study conducted in 1984-1985, in the province of Ontario, Canada, assessed the bacteriological quality of three types of non-dairy substitutes including creamers, fillings and toppings. All sample units tested contained acceptable levels of aerobic colony count (ACC), yeast/mold and aerobic sporeformers. Escherichia coli, Staphylococcus aureus and Salmonella were not detected in any of the 79 lots tested, indicating that good hygienic practices were used during the manufacture of these products.

Non-dairy toppings, fillings and creamers are increasingly being used as substitutes for their dairy counterparts, mainly because of their convenience. Non-dairy creamers and whiteners are sold as pasteurized or ultra-high temperature (UHT) treated products. Dairy substitute toppings and fillings are sold as powders, aerosols, frozen ready-to-serve whipped or non-whipped products.

The dry non-dairy toppings are frequently reconstituted with milk and eggs before use to increase nutritional value and/or flavor. These reconstituted powders, as well as thawed frozen products, will support microbial growth to the same extent as their dairy counterparts (12). If used as fillings or toppings for baked goods, they may be subjected to temperature abuse, both as ingredients and as finished products (12). Nevertheless, dairy substitute toppings, fillings and creamers have enjoyed a fairly good safety record.

In Canada, no major cases of foodborne disease, associated with these products have been reported. Two minor incidents of unknown etiology involving a total of five cases occurred in 1976, with artificial coffee creamer being identified as the vehicle of illness. Patients developed cramps and diarrhea in both incidents while vomiting was reported only in one incident (3). In 1978, another case of illness was linked to artificial coffee creamer, with no causative agent being identified (7).

The most serious case of food poisoning involving a non-dairy substitute occurred in 1962. In this episode, imitation cream in donuts was found to contain staphylococcal enterotoxin A (10).

The present study, conducted in 1984-85, assesses the overall bacteriological quality of three types of non-dairy substitutes; creamers, fillings, and toppings.

MATERIALS AND METHODS

Forty-nine lots of coffee whiteners (43 powdered and 6 frozen), 24 lots of cream filling substitutes (23 aerosol and 1 frozen), and 6 lots of powdered whipped toppings were randomly sampled across Ontario, Canada. Three sample units were taken per lot of product, except sterile products where up to 24 sample units were taken.

Health Protection Branch methods were used to analyze 10 g of each sample unit for aerobic colony (ACC) counts (4), aerobic sporeformers (2), Staphylococcus aureus (8), Escherichia coli (5), yeast and molds (6), and 25 g for the presence of Salmonella (1).

RESULTS AND DISCUSSION

S. aureus (<5/g) and Salmonella (<1/25g) were not detected in any of the non-dairy coffee creamers, cream fillings and whipped toppings tested, while levels of presumptive coliforms were below the lower limit of detection (<2/g.). The microbial profile of the dairy substitutes tested is shown in Table 1. All sample units of coffee whiteners had ACC, yeast/mold, and aerobic sporeformer counts <1000/g. For cream filling substitutes, 92% of the sample units had ACC value <5000/g, whereas all sample units yielded yeast/mold and aerobic sporeformer counts <500/g. All whipped topping sample units had ACC <1000/g, yeast/mold <100/g and aerobic sporeformers <500/g.

Absence of pathogens and non-detectable levels of coliforms suggests that good hygienic practices were used...
TABLE 1. Percentage frequency distribution of dairy substitutes in population levels.

<table>
<thead>
<tr>
<th>Product</th>
<th>Organism</th>
<th>No. of lots</th>
<th>&lt;5</th>
<th>&gt;5-100</th>
<th>&gt;100-500</th>
<th>&gt;500-1000</th>
<th>&gt;1000-5000</th>
<th>&gt;5000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Coffee whiteners (powdered)</td>
<td>ACC</td>
<td>46</td>
<td>37</td>
<td>12</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>yeast/mold</td>
<td>61</td>
<td>37</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>sporeformers§</td>
<td>54</td>
<td>30</td>
<td>12</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Coffee whiteners (frozen)</td>
<td>ACC</td>
<td>50</td>
<td>50</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>yeast/mold</td>
<td>100</td>
<td>-</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>sporeformers</td>
<td>83</td>
<td>17</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Cream filling substitutes</td>
<td>ACC</td>
<td>63</td>
<td>17</td>
<td>-</td>
<td>8</td>
<td>4</td>
<td>8</td>
<td>-</td>
</tr>
<tr>
<td>(aerosol)§</td>
<td>yeast/mold</td>
<td>96</td>
<td>-</td>
<td>4</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>sporeformers</td>
<td>79</td>
<td>13</td>
<td>8</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Whip topping (powdered)</td>
<td>ACC</td>
<td>-</td>
<td>33</td>
<td>-</td>
<td>67</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>yeast/mold</td>
<td>83</td>
<td>17</td>
<td>-</td>
<td>-</td>
<td>-</td>
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<td></td>
<td>sporeformers</td>
<td>-</td>
<td>83</td>
<td>17</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

§2 Samples were not analyzed for sporeformers.

Includes 1 frozen lot, which had counts <5 for all tests.

during the manufacture of these products. The ACC counts in this study are similar to those reported by Smutz et al. (13) in their survey of imitation and filled dairy products where ACC values for 13 samples of powdered coffee whiteners were <10-200/g with an average count of 50/g. Homologous values for samples of powdered and aerosol topping, were 20-700/g (average 220/g) and <10-150/g (average 19/g), respectively. Payne et al. (11) found that 98.7% of the 1,559 samples of powdered non-dairy coffee creamers tested yielded ACC <1000/g, while 96.9% had coliform counts <3/g, 99.7% had S. aureus counts ≤10/g and 99.9% had yeast/mold counts of <500/g. A study of dessert toppings by Duitschaever et al. (9) showed powdered toppings with an average ACC of 312/g and in contrast, an average coliform count of 14/g. The results obtained in these studies suggest that dairy substitutes of good microbial quality can be produced. However, to ensure public safety continual monitoring by the manufacturers and public health officials is recommended.

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REFERENCES