Microflora of Vacuum Packaged Beef Steaks and Roasts Treated with an Edible Acetylated Monoglyceride

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ABSTRACT

Steaks and roasts were fabricated from strip loins and top rounds that were held vacuum packaged for 10 d at 2°C. Steaks and roasts then were treated with 2-3% Dermatex® Food Grade (DFG), an acetylated monoglyceride, vacuum packaged and stored at 2 ± 2°C for up to 4 weeks (steaks) and 7 weeks (roasts). Aerobic plate counts (APC) and APT counts of control and DFG-treated steaks and roasts did not differ (P>0.05) during refrigerated storage. The microflora of steaks and roasts during storage was dominated by lactic acid bacteria. Treatment of vacuum-packaged beef steaks and roasts prepared from vacuum-packaged strip loins and top rounds. Information on the physical and sensory characteristics of beef steaks and roasts treated with DFG is presented in a companion report by Griffin et al. (3).

RESULTS AND DISCUSSION

APCs and APT counts of control and DFG-treated steaks and roasts did not differ (P>0.05) during refrigerated storage, except at one storage interval (Tables 1,2). Largest increases in count occurred during the first 2 weeks of storage. Counts of steaks and roasts were higher (P<0.01) on APT agar than on TSA.

The microflora of control and DFG-treated steaks and roasts at day 0 (Tables 3,4) was dominated by lactic acid bacteria. For example on steaks, lactic acid bacteria (Streptococcus, Leuconostoc and Lactobacillus) comprised 75.5 to 82% of the microflora. In addition, Brochothrix thermosphacta, coryneform bacteria, Micrococcus spp., Pseudomonas spp., coagulase-negative Staphylococcus spp., (DFG-treated steaks only) and Moraxella-Acinetobacter spp. (DFG-treated steaks only) were also present in the microflora.
were present in small percentages. The microflora of
steaks and roasts stored at 2°C for 4 and 7 weeks, re­
spectively, was completely dominated by lactic acid bacteria
(99.4-100%), primarily by *Leuconostoc* spp.

The percentage of lactic acid bacteria calculated from the
microflora appearing on APT plates from samples at
day 0 was slightly greater than that calculated from the
flora on TSA plates. These differences were 3.4% for
control steaks, 14.3% for control roasts, 11.8% for DFG-
treated steaks and 6.8% for DFG-treated roasts. At and
after 2 weeks of refrigerated storage, these differences
disappeared as the microflora then became completely
dominated (97 to 100%) by lactic acid bacteria.

Level of total counts on TSA and APT agar and domi­
nance of lactic acid bacteria on steaks and roasts at day
0 of storage are within normal range as they were fabri­
cated from loins and rounds that were held vacuum pack­
age under refrigeration for 10 d. It is not uncommon
in the United States for subprimals to be held for 1 to

TABLE 1. Means of aerobic plate counts (APC) and APT
counts of vacuum packaged loin steaks with and without Der­
amatex (DFG) and stored at 2 ± 2°C for up to 4 weeks.

<table>
<thead>
<tr>
<th>Storage time (weeks)</th>
<th>Log_{10} count/cm²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
</tr>
<tr>
<td>0</td>
<td>4.29c</td>
</tr>
<tr>
<td>2</td>
<td>5.85b</td>
</tr>
<tr>
<td>3</td>
<td>6.04b</td>
</tr>
<tr>
<td>4</td>
<td>6.31b</td>
</tr>
</tbody>
</table>

aMeans in the same row underscored by a common line do not differ (P>0.05).
bMeans in the same column bearing a common superscript letter
do not differ (P>0.05).

TABLE 3. Distribution of microflora of vacuum packaged loin steaks with and without Dermatex (DFG) and stored at 2 ± 2°C for up to 4 weeks.

<table>
<thead>
<tr>
<th>Storage time (weeks)</th>
<th>Percentage distribution of microflora²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L. plant</td>
</tr>
<tr>
<td>0</td>
<td>13.9</td>
</tr>
<tr>
<td>4</td>
<td>3.6</td>
</tr>
</tbody>
</table>


TABLE 4. Distribution of microflora of vacuum packaged round roasts with and without Dermatex (DFG) and stored at 2 ± 2°C for up to 7 weeks.

<table>
<thead>
<tr>
<th>Storage time (weeks)</th>
<th>Percentage distribution of microflora²</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>L. plant</td>
</tr>
<tr>
<td>0</td>
<td>4.3</td>
</tr>
<tr>
<td>7</td>
<td>3.7</td>
</tr>
</tbody>
</table>


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2 weeks before fabrication into retail cuts because of the distances of shipping and because of maintenance of sufficient inventories at the packer and retail level. Results of the present study indicate that treatment with DFG of steaks and roasts prepared from loins and rounds that were held for 10 d did not cause any substantial changes in the microbial characteristics of the vacuum-packaged steaks and roasts during storage at 2°C for 4 and 7 weeks, respectively. In addition, results of the companion study (3) did not show any substantial changes in the physical and sensory characteristics of the steaks and roasts that could be attributed to the DFG treatment. It is possible that the extension of shelf-life and potential reductions in microbial counts on red meats attributed to treatment with DFG (4,7) apply only to very fresh cuts (2-4 d postmortem) of meat. On such meats of high quality, one would expect somewhat lower counts and a more varied microflora than on vacuum-packaged subprimals held for 1-2 weeks.

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REFERENCES


Bradshaw, et al., con't. from p. 544

dated at 71.7°C (161°F) for 15 s in raw, whole milk (3) or in ice cream mix properly pasteurized at 79.4°C (175°F).

These results reaffirm the adequacy of pasteurization to destroy L. monocytogenes suspended in raw dairy products. Results from sterilized products indicate the need for further study.

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