Spray washes of organic acids to decontaminate pork carcass tissues in India

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Abstract: Medical and commercial requirements to extend safe, high quality shelf life of food, have focussed attention on decontamination systems. Organic acid sprays of acetic, propionic and lactic at 3Kg/cm² pressure and 1%, 2% and 3% concentrations, individually and in combination, were used to decontaminate pork samples. It was observed that out of 3 acids lactic acid at 2% was found to reduce the total viable count (TVC) by 0.07 log units whereas the combination treatment of 3% acetic and propionic acids resulted in 0.09 log unit reduction of TVC without affecting the color and odour score. The shelf life, on analysis, was found to almost double at refrigeration storage as compared to control. Thus, 2% lactic acid and 3% acetic + propionic acids offer scope for reduction in microflora and suppression of pathogen proliferation on pork samples during refrigeration storage and transport, thereby improving meat quality and shelf life.

Keywords: Meat, preservation, shelf life, lactic, acetic-propionic.

Introduction: Enormous losses of highly perishable foods of livestock origin have been reported due to high bacterial load and fungal spoilage because of improper cold chain, transport facilities, handling, climatic conditions etc. (Petzinger & Ziegler, 2000 & Hansson 2001). The present study is thus undertaken with the objective of the study and comparison of the antimicrobial effects of organic acids alone and in combination on the bio-load, sensory attributes and shelf life of pork samples stored at refrigeration temperatures. This would help to select an appropriate and suitable treatment for carcass/meat decontamination at field level, especially in the face of inadequate chilling facilities for transportation and distribution.

Materials and Methods: Pork forequarters were procured from freshly slaughtered animals from a government approved slaughterhouse. These were deboned, deglanded and sprayed with acid solutions of food grade quality. Untreated, appropriate controls were included in the experimental trials. These were divided into 20 gram portions, packed in low-density polyethylene pouches, sealed and carried to the laboratory in icebox and stored at refrigeration
temperatures (5-7 °C). Sensory and microbiological analysis was carried out at scheduled intervals. Sensory characters viz. colour and odour of pork meat were studied as prescribed by Woolthuis and Smulders (1985) and Acuff et al (1987). All the meat samples were analyzed for the Total viable count (TVC), and for the presence of pathogenic and spoilage organisms by adopting standard approved procedures (Cheesbrough (1985)).

Results:

**Table 1: Effect of acid treatment on sensory characteristics of pork samples.**

<table>
<thead>
<tr>
<th>Day-&gt;</th>
<th>Control</th>
<th>2% Lactic Acid</th>
<th>Control</th>
<th>3% AA+PA</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 3 4</td>
<td>0 3 4</td>
<td>0 3 4</td>
<td>0 3 4</td>
</tr>
<tr>
<td>Color</td>
<td>2 4 5</td>
<td>1 2 3</td>
<td>1 4 5</td>
<td>1 2 2</td>
</tr>
<tr>
<td>Odor</td>
<td>1 2 3</td>
<td>1 2 3</td>
<td>1 2 3</td>
<td>1 1 2</td>
</tr>
</tbody>
</table>


Odor Score: 1. No off-odor; 2. Slightly off-odor; 3. Moderately off-odor

**Figure 1: Effect of individual and combination acid treatments on pork shelf life**

**Figure 3: Preservative effect of acid sprays on pork samples at refrigeration temperatures**
Discussion: 3% Lactic acid was found to be most efficient in increasing shelf life of pork however it developed unacceptable color changes. On the other hand 2% lactic acid treatment increased the shelf life of meat without changes in organoleptic characters and hence was considered to be superior for individual acids. Besides combination of 3% acetic acid and propionic acid proved to be the best treatment for improving shelf life without affecting sensory qualities (Table 1, Figure 1). It was observed that out of the three acids used for spray washing, lactic acid at 2% was found to reduce the total viable count by 0.7 log units, where as the combination treatment of acetic and propionic acid resulted in 0.99 log unit reduction of the same, without affecting the color and odor scores (Figure 2). Besides lactic acid and combination of acetic and propionic acid treatment was found to be highly effective against many common pathogens and spoilage organisms.

References

Acknowledgement:
Indian Council of Agricultural Research(Financier) and Sangita Pawar.