ASSOCIATION BETWEEN *Salmonella* POSITIVE MESENTERIC LYMPH NODE/INTESTINAL CONTENTS AND CONTAMINATION OF TONSILS/HEAD LYMPH NODES OF PIGS AT SLAUGHTER

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**Abstract:** The objective of this study was to assess the association between *Salmonella* carriage in mesenteric lymph nodes and/or intestinal contents of pigs at slaughter and the contamination of tonsils and head lymph nodes of the same animal. Samples were taken from 90 pigs in an abattoir with high prevalence of *Salmonella* positive pigs at slaughter. From each animal mesenteric lymph nodes (ML), intestinal contents (IC), tonsil and mandibular lymph node pools (HP) were taken. In 71 (79%) slaughtered pigs *Salmonella* was isolated in at least one of these samples. There was no significant relationship between *Salmonella* detection in ML or IC and positive HP, but animals positive in HP had likewise positive LM and/or IC. The three materials collected were altogether positive for *Salmonella* in 22 animals (31%), pointing to the possibility that these animals carried the pathogen already at the finishing farm.

**Keywords:** *Salmonella*, slaughtered pigs, tonsils/lymph nodes contamination

**Introduction:** In a previous study, the prevalence of *Salmonella* carriage in slaughtered pigs in the State of Rio Grande do Sul, Brazil, was high (Bessa *et al.*, 2001). Mesenteric lymph nodes and intestinal contents may be the source of cross-contamination during pork processing, but they are not directly employed in making the products consumers buy. Yet tonsils, mandibular lymph nodes and head muscles are used in sausage production. If contaminated, these ingredients may be directly responsible for the presence of *Salmonella* in the final product.

**Materials and Methods:** Mesenteric lymph nodes (ML), intestinal contents (IC), and a tonsil and mandibular lymph nodes pool (HP) were collected from 15 animals at 6 visits on an abattoir with high prevalence of animals positive for *Salmonella* sp. at slaughter. A total of 90 animals were sampled. In the laboratory, each sample (25g) were submitted to a *Salmonella* isolation protocol as previously described (Michael *et al.*, 1999). The data were statistically assessed using the Statistical Analysis System (SAS) Chi-square test.
Results: In 71 (79%) animals *Salmonella* sp. was isolated in at least one of the samples analyzed. Out of 68 animals presenting *Salmonella* sp. in mesenteric lymph nodes (ML) and/or intestinal contents (IC), 30 were positive as well for the tonsil and mandibular lymph nodes pool (HP). In 3 animals, *Salmonella* sp. was isolated only in HP (Table 1). HP samples positive for *Salmonella* were associated (P=0.001) with positive ML and/or IC samples. On the contrary, there was no association between IC samples (P=0.233) or ML samples (P=0.895) positive for *Salmonella*, and positive HP samples. Nevertheless, animals negative in IC and ML were also negative for *Salmonella* in HP (P=0.001). Finally, an association between positive IC and positive ML (P=0.001) was observed, as well as between positive ML and positive IC (P=0.010).

**TABLE 1:** Isolation of *Salmonella* sp. from mesenteric lymph nodes, intestinal content and mandibular lymph nodes/tonsils pools of pigs at slaughter

<table>
<thead>
<tr>
<th>Visit</th>
<th>Sampled Animals</th>
<th>HP</th>
<th>ML</th>
<th>IC</th>
<th>HP+ML</th>
<th>HP+ML+IC</th>
<th>HP+IC</th>
<th>ML+IC</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>15</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>0</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>II</td>
<td>15</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>III</td>
<td>15</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
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<td>5</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>V</td>
<td>15</td>
<td>1</td>
<td>3</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>VI</td>
<td>15</td>
<td>0</td>
<td>2</td>
<td>1</td>
<td>7</td>
<td>2</td>
<td>2</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>90</td>
<td>3</td>
<td>14</td>
<td>9</td>
<td>22</td>
<td>4</td>
<td>4</td>
<td>15</td>
</tr>
</tbody>
</table>

HP  mandibular lymph nodes/ tonsils pool  
ML  mesenteric lymph nodes  
IC  intestinal content

Discussion: Swine may frequently carry *Salmonella* sp. in the intestinal tract and mesenteric lymph nodes (Di Guardo et al., 1992). Lymph nodes and intestinal contents are considered to be important sources of cross-contamination by *Salmonella* during slaughtering process, increasing thus the hazard of final product contamination. *Salmonella*-contaminated tonsils in particular may be significantly related to the presence of the pathogen in carcasses, and were proposed as a marker of cross-contamination (Swanenburg et al., 1999). On the other hand, mandibular lymph nodes and tonsils remain in the carcass after slaughter. These lymph nodes along with the muscles around are used in the fabrication of sausages and will eventually reach consumers. In this study, no significant association was found between the presence of *Salmonella* sp. in IC or ML and positive HP, pointing to the possibility that animals positive for *Salmonella* sp. in the intestinal tract do not carry the microorganism in other parts of the carcass. Apart from this, most of times *Salmonella* was isolated concurrently in all materials collected. Thus in this
slaughtering-plant, the presence of *Salmonella* positive HP seems to be related more closely to an infection happened at the finishing farm than to cross-contamination at slaughter. Nevertheless, the association between positive ML carcasses and the isolation of *Salmonella* sp. from IC indicates that the hazard of cross-contamination persists. Since the level of *Salmonella* detected in HP was considered high, further research is being conducted to ascertain how hazardous these levels are to the end-product.

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**References**

