THE SALMONELLA SITUATION IN
SWEDISH PIGS AND PORK PRODUCTION

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The objective of the Swedish salmonella control is to ensure that food of animal origin is free from salmonella. The strategy is to prevent infection/contamination in feed and animals. Any finding of salmonella is notifiable and action is always taken to eliminate the infection. Repeated surveys have been performed in order to control the efficacy of the salmonella control (Robertsson, 1976; Wierup et al., 1992; Wahlström et al., 1993; Hopp et al., 1996). Since 1995 continuous monitoring programmes aimed at documenting the prevalence of salmonella and detecting foci of infection are in force (Anonymous, 1995).

The aim of the present paper is to describe the results of the surveillance in the Swedish salmonella control programme in pigs and pork during 1996.

MATERIALS AND METHODS

Sampling and samples

\textit{Slaughter houses:} At the 12 major slaughter houses, slaughtering approximately 90\% of the total number of annually slaughtered pigs, sampling were performed daily. At the remaining 52 minor slaughter houses sampling was performed once in certain specified weeks. If no pigs were slaughtered these weeks sampling was not performed.

Samples consisted of intestinal lymphnodes from one fattening pig and one adult pig and swabs from one fattening pig and one adult pig.

\textit{Lymph nodes:} From each sampled carcass at least five intestinal lymphnodes in the ileo-caecal region were collected.

\textit{Surface swabs:} From each sampled carcass approximately 1400 \text{cm}^{2} was swabbed with two sterile swabs (10 x10 cm) moistured with phosphate buffered saline. The upper inner part of the hind legs and approximately five cm of the adjacent skin and the pelvic entrance (approximately 30 cm x 20-25 cm) was swabbed with one swab. The cut surface area of the abdomen and chest and approximately five cm of the adjacent skin surface (approximately 70-80 cm x 8-10 cm) was swabbed with the second swab.

\textit{Cutting plants:} In cutting plants handling beef or pork (n=55) sampling were performed daily, monthly, weekly or biannually depending on the capacity of the plant. Samples consisted of 25 grams of crushed meat, collected from equipments or from trimmings.

\textit{At sanitary slaughter:} All sanitary slaughtered pigs were examined for salmonella. Samples consisted of liver and spleen. If the spleen was not available body lymph nodes were collected instead.

\textit{In herds:} During 1996 sampling was performed in 49 elite breeding herds, 145 gilt producing herds and 23 sow pools. In each herd, 59 faecal samples were collected once in elite
breeding herds and gilt producing herds and twice in sow pools. Samples were collected from pigs/pens evenly distributed over the herd. In integrated and fattening herds affiliated to a health control programme two pooled samples (each consisting of five faecal samples from different pens) were collected. Samples consisted of at least 10 grams of faeces from each animal/pen.

_Bacteriological examination_

Lymphnodes, swabs and meat samples were sent refrigerated to the laboratory and kept refrigerated until cultivation. Analysis were performed within one to seven days after collection. Faecal samples were analysed within two days. Until February 1996, analysis were performed according to the NMKL no. 71 ed. 4. After 1996 03 01 analysis were performed according to a modified ISO 6579:1993. The most essential modification being the exclusion of the selenite broth enrichment step.

_Lymph nodes:_ Lymphnodes from at most 10 animals from the same category were pooled to about 25 grams and analysed. Each lymph node was dived in two parts. One half was crushed in a mortar before analysis and the other half was stored at 4 °C until the bacteriological examination was completed. If salmonella was isolated from a pooled sample each individually stored sample was analysed separately.

_Surface swabs._ Each sample was pre-enriched separately. One drop from each of at most 15 samples originating from the same slaughter house were pooled for further analysis. Each pre enrichment was stored until the bacteriological examination was completed.

_Crushed meat samples:_ At cutting plants with daily sampling, five samples collected during the same week were pooled to 25 grams and analysed. Samples from the remaining cutting plants were analysed separately.

_Faecal samples:_ Five to 15 faecal samples from one herd were pooled to 25 grams and analysed.

RESULTS AND DISCUSSION

In the present study the prevalence of positive samples were 0-0.15% (Table 1). Although the number of samples collected from slaughter houses were not proportional to the total slaughter at each slaughter house it can be concluded that the salmonella prevalence in Swedish pigs and pork is very low.

The results are in accordance with earlier findings as well as statistics on notified cases of salmonella. Bacteriological examinations of intestinal lymph nodes from normal slaughtered pigs have shown that in 1975, 37 out of 18083 (0.2%) (Robertsson J.Å., 1976), in 1990, 22 out of 2924 (0.8%) (Wahlström et al. 1993), in 1994-1995, 12 out of 5806 (0.2%) (Unpublished results) and in 1995 three out of 3082 (0.1%) (Hopp et al., 1996) lymph node samples were positive for salmonella. The higher prevalence found in 1990 was mainly due to persisting Salmonella (S) Derby infection in a few large fattening pig herds (Wahlström et al. 1993). In the last 30 years, the number of notified cases of salmonella in pig herds has decreased and in the last 20 years, usually less than five infected herds have been notified annually (Anonymous).

Previous years findings of salmonella in integrated or weaner pig producing herds have been extremely rare but during the last two years three integrated herds have been found infected with salmonella. Of these herds one was infected with S. Derby (Table 1). Based on previous knowledge of difficulties in eliminating S. Derby in fattening herds in combination
with difficulties in implementing the usual strategy for eliminating salmonella from infected herds, the whole herd was depopulated. It is unclear whether the increased number of infected integrated or weaner pig producing herds is due to the extended surveillance or if it reflects a change in the epidemiological situation.

Table 1. No. of positive, no. of sampled animals/herds and type of sample in the salmonella control in pigs and pork during 1996

<table>
<thead>
<tr>
<th>No. pos./ Percent pos.</th>
<th>Sample</th>
</tr>
</thead>
<tbody>
<tr>
<td>No. of samples</td>
<td></td>
</tr>
<tr>
<td>Sows and boars</td>
<td>3/2009</td>
</tr>
<tr>
<td>- &quot;&quot; -</td>
<td>0/1994</td>
</tr>
<tr>
<td>Fattening pigs - &quot;&quot; -</td>
<td>1/2699</td>
</tr>
<tr>
<td>- &quot;&quot; -</td>
<td>0/2702</td>
</tr>
<tr>
<td>Sanitary slaughtered pigs</td>
<td>0/2398</td>
</tr>
<tr>
<td>Elite breeding herds</td>
<td>0/1931</td>
</tr>
<tr>
<td>Gilt producing herds</td>
<td>0/5111</td>
</tr>
<tr>
<td>Sow pools</td>
<td>0/1315</td>
</tr>
<tr>
<td>Weaner pig producing/ integrated herds</td>
<td>1/1081d</td>
</tr>
</tbody>
</table>

Cutting plants | 0/5510 | 0% | c.m. |

In=lymph nodes, sw=surface swabs, f.s.= faecal samples, c.m.=crushed meat
a) S. Typhimurium DT 10 and S. Typhimurium DT 129 (two isolates from the same herd),
b) S. Typhimurium DT 10 and 66 (interpreted as the same strain), c) S. Derby, d) Herds

REFERENCES
Anonymous, Swedish Board of Agriculture, Records of outbreaks of Salmonella.


