Salmonella surveillance in Styrian meat cutting plants

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Abstract: Bacteriological examinations for Salmonella in meat cutting plants constitute an important cornerstone in the Styrian Salmonella surveillance programme for pork production. A total of 1920 bulk wipe samples were tested in 1999. Salmonella was detected in 7 samples taken prior to retail cutting (n = 720), in one sample taken after retail cutting (n = 720) and in one of the swab samples collected from cutting surfaces (n = 480). The extrapolation from the random sample to the population of pork produced and cut in Styria showed the estimated average proportion $\hat{p}$, of Salmonella contaminated pork to be 0.15 % S = 95 %; CI 0.12 % ≤p≤ 0.18 %. Based on these results sampling was restricted to wholesale cuts and carcass halves from 8 slaughterhouses and meat cutting plants in 2000. Testing a total of 1290 bulk wipe samples Salmonella were detected in three cases ($\hat{p} = 0.14\%, S = 95\%$; CI 0.17 % ≤p≤ 0.25 %). This favourable situation, which was corroborated by serological examinations of finishing pig herds, does not indicate an urgent call for action in Styrian breeding and finishing establishments.

Keywords: contamination, pathogens, screening, pork, wipe samples

Introduction: Salmonella is the prime causative agent of enteritis infectiosa in humans. Epidemiological investigations in many European countries have indicated the increasing significance of pork as the source of the infection. Steinbach and Hartung (1999) estimate the share of human infections due to the consumption of pork at about 20 %. Berends et al. (1998a) obtained similar estimates of 15 % for the Netherlands. This study presents results of a study on Salmonella contamination of pork during the meat cutting process. Being the last processing step prior to distribution, meat cutting plays an essential role in the prevention of cross contamination with Salmonella and is thus of major importance for efficient consumer protection.

Material and Methods:
In Styria, a total of 720 bulk wipe samples from wholesale pork cuts (5 parts), 720 wipe samples from retail pork cuts (25 kg) and 480 wipe samples collected from
work surfaces in the cutting department (0.5 m²) were tested for Salmonella in 1999. The *Salmonella* prevalence in pork determined prior to cutting allows the total Salmonella contamination of Styrian pork to be estimated on the basis of two stage cluster sampling (Cochran, 1972). In the following year (2000) sampling was restricted to wholesale cutting. The sampling plan comprised a total of 1290 bulk wipe samples (5 parts each) of carcass halves and wholesale cuts. The wipe samples were enriched in buffered peptone water (18 h, 37 °C) and 3 drops of the broth were applied onto an MSRV medium (24 h, 42 °C). Suspected samples were streaked onto XLD agar and subsequently confirmed by means of a polyvalent antiserum. The Salmonella serovars (Kauffmann-White scheme) and their resistance patterns (agar diffusion test according to DIN58940) were determined by the Federal Laboratory for Bacteriology and Serology in Graz (*Salmonella* Centre).

**Results:** *Salmonella* was detected in 7 of the 720 wipe samples taken prior to retail cutting (5 x *S. infantis*, 2 x *S. enteritidis* PT 4). Two-stage cluster sampling showed the estimated proportion $\hat{p}$ of *Salmonella* contaminated pork cuts in the total population to be 0.15 %. The 95 % confidence interval was in the range (0.12 % ≤p≤ 0.18 %). Only one of the 720 wipe samples taken after retail cutting produced a positive result (*S. typhimurium* DT 104). The examination of the 480 wipe samples taken from the cutting surfaces also yielded only one positive result (*S. infantis*). The situation was similar in the following year. *Salmonella* was detected in 3 (*S. enteritidis*, *S. livingstone*, *S. typhimurium*) of the 1290 bulk wipe samples of carcass halves and wholesale pork cuts ($\hat{p} = 0.14\%$, $S = 95 \%$; CI 0.17 % ≤p≤ 0.25 %).

**Discussion:** The extrapolation from the sample to the population of slaughter pigs cut and processed in Styria showed the estimated proportion $\hat{p}$ of *Salmonella* contaminated pork to be 0.15 % ($S = 95 \%;$ CI 0.12 % ≤p≤ 0.18 %) in 1999. The estimated proportion $\hat{p}$ of 0.14 % ($S = 95 \%;$ CI 0.17 % ≤p≤ 0.25 %) for 2000 shows an equally favourable situation. The results of *Salmonella* screening in the cutting facilities also confirm the results obtained from analyses performed in 1997 and 1998, during which *Salmonella* was detected in 0.4 % of wipe samples (n = 1040) from pork carcass halves (Köfer et al., 2000).

In view of the results obtained, *Salmonella* contamination of Styrian pork can be considered as being extremely low. The situation is thus comparable to Denmark (Mousing and Nielsen, 1999), where a *Salmonella* surveillance programme for pork production was established several years ago, whereas studies carried out in Belgium (Korsak et al., 1997) and the Netherlands (Berends et al., 1998b) have shown the average *Salmonella* contamination rate of pork to range between 25 and 30 %.
Conclusions: This favourable situation, which was corroborated by serological examinations of finishing pig herds, does not indicate an urgent call for action in Styrian breeding and finishing establishments. Consistent *Salmonella* monitoring at herd level and in the cutting departments provides the possibility to react to any deterioration by immediate countermeasures.

References


