in this study indicated that use of mash feed in younger animals may help to significantly reduce the shedding of Salmonella in contaminated nurseries. While the exact mechanism associated with this protection is unclear some authors suggested that the microflora of non-pelleted feed act by competitive exclusion. The coarse grinding (1100 \( \mu \text{m} \)) was also found important in the current study to reduce the shedding of Salmonella. Use of mash feed can thus be considered as an interesting measure that can be part of a comprehensive plan to control Salmonella in swine farms.

Conclusions: Research are currently conducted to assess the efficacy, in field conditions, of mashed feed in older animals and to understand how the size of feed particles can affect the shedding of Salmonella.

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Pilot experiment with the aim to reduce salmonella prevalence in pork by logistic slaughter of pigs

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Summary: A pilot experiment was carried out with the aim to evaluate the possibilities and results of logistic slaughter of pigs (separate slaughter of salmonella-free and salmonella-infected pig herds) under usual circumstances in a Dutch slaughterhouse. During the experiment salmonella-free herds were delivered and slaughtered on Tuesday mornings. Herds delivered on Thursday mornings served as a control group. No significant difference could be found in the number of salmonella-positive
carcasses on Tuesdays and Thursdays. This was mainly caused by contamination of carcasses by contaminated slaughter equipment; 80% of all salmonella strains on carcasses were equal to strains isolated from slaughter equipment. If these salmonella strains were not included in the results, logistic slaughter did result in a significantly lower prevalence of salmonella on carcasses on Tuesdays. It was concluded that separate slaughter of salmonella free pig herds can result in a lower salmonella prevalence on carcasses, but only if slaughter hygiene and especially cleaning and disinfection before and during processing will be improved.

Introduction: In The Netherlands salmonella in pork is responsible for about 25% of all cases of human salmonellosis. Efforts are made to introduce a salmonella control plan in the pork chain. Before introducing such a plan, a pilot experiment was carried out with the aim to evaluate the possibilities and results of logistic slaughter of pigs (separate slaughter of salmonella-free and salmonella-infected pig herds) under usual circumstances in a Dutch slaughterhouse.

Materials and methods: The experiment was carried out in a Dutch pig slaughterhouse, which slaughters 600 to 650 pigs per hour. The experiment consisted of two phases. In the first phase herds with negative or low salmonella prevalence were selected for taking part in the experiment. Selection was based on serological screening of herds for a period of three months (Van der Wolf et al, 2003). In total, 52 herds were selected, which was sufficient to ensure that each week on the same day at least 2000 pigs from the selected herds could be delivered. In the second phase of the experiment the selected herds delivered their pigs during 6 weeks on Tuesday mornings. Pigs from selected herds were delivered to the slaughterhouse before pigs from other herds and both groups were kept separately. Pigs delivered on Thursday mornings served as the control group. The lairage and the slaughterline were cleaned and disinfected thoroughly before pigs were delivered.

To determine the effect of the separate slaughter, the following samples were collected from the slaughtered pigs and the environment: 1200 blood samples, 122 faecal samples from the lorry of each delivered herd, 594 carcass samples, 302 tonsils, 110 swab samples from slaughter equipment before and after slaughter and 60 swab samples from the lairage before pigs were delivered and 60 after the pigs had left the lairage. If the faecal lorry sample of a particular herd was salmonella positive one or more times, then 4 pooled faecal samples were collected on the farm. Blood samples were tested with the Dutch salmonella mix ELISA by the Animal Health Service (see van der Wolf et al, 2003). All other samples were tested for the presence of salmonella according to standard procedures (same as in Swanenburg et al, 2003). Statistics were done with Statistix 7.0.

Results: 39 of the 52 selected herds delivered pigs to the slaughterhouse one or more times during the second phase of the experiment. The number of salmonella-positive carcasses on Tuesdays and Thursdays did not differ significantly. The number of salmonella-positive tonsils on Tuesdays was significantly lower than on Thursdays, indicating that on Tuesdays pigs with lower salmonella prevalence were delivered. 80% of all salmonella strains on carcasses (table 1) were equal to strains isolated from slaughter equipment (S. bovismorbificans). If these salmonella strains were not included in the results, logistic slaughter did result in a significantly lower prevalence of salmonella on carcasses on Tuesdays in weeks 4, 5 and 6 of the experiment.

Table 1: Salmonella serotypes, isolated from carcasses, phase 2

<table>
<thead>
<tr>
<th>Serotype</th>
<th>Percentage of total</th>
</tr>
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<tbody>
<tr>
<td>S. Bovismorbificans</td>
<td>76</td>
</tr>
<tr>
<td>S. Brandenburg</td>
<td>11</td>
</tr>
<tr>
<td>S. Typhimurium (4 phage types)</td>
<td>9</td>
</tr>
<tr>
<td>S. Panama</td>
<td>2</td>
</tr>
<tr>
<td>S. Infantis</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
</tbody>
</table>
From the 39 herds that delivered pigs, salmonella was isolated from the lorry faecal samples from 20 herds. In some cases the salmonella serotype that was found in the lorry was equal to the type isolated from carcasses from the same herd. For only 2 of 20 herds the serotypes isolated in the lorries were equal to the salmonella types isolated from farm faecal samples.

**Discussion:** The results showed that the number of salmonella positive tonsils on Tuesdays was significantly \( (p= 0.0006) \) lower than on Thursdays, which indicates that on Tuesdays less salmonella infected herds were delivered to the slaughterhouse, and the infection pressure was lower than on Thursdays, which was the aim of logistic delivery of herds. However, on Tuesdays the number of salmonella contaminated carcasses was not lower than on Thursdays. There are three possible explanations for this fact. First, not all pigs from the selected herds were salmonella-free, so that cross contamination within and between herds could have happened. Second, the lorries and the lairage were not completely free of salmonella on all days. However, only a few times salmonella types, found in the lorries, were also isolated from carcasses. Salmonella types found in the lairage were hardly isolated from carcasses, so the lorry and lairage were not a major cause for contamination of the carcasses. Thirdly, results showed that cross contamination from slaughter equipment to carcasses took place during slaughter. Salmonella was isolated from slaughter equipment before slaughter started sometimes during the experiment. The salmonella serotype, isolated from the carcass splitter was equal to the serotype that was isolated from 80% of the salmonella-positive carcasses. It seemed that a salmonella “house flora” was present on the splitter. This was shown before in other pig slaughterhouses by Swanenburg et al. (2001) and Dahl (2002). Although the slaughter equipment is cleaned and disinfected daily, some parts of the machines are out of reach of the cleaning, so these parts are never being cleaned, and salmonella can “hide” on these parts.

It was concluded that separate slaughter of salmonella-free pig herds can result in a lower salmonella prevalence on carcasses, but only if slaughter hygiene and especially cleaning and disinfection before and during processing will be improved. When new slaughter equipment is designed special attention has to be paid to the fact that it should be possible to easily clean and disinfect the equipment completely during as well as after processing.

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**References:**


