Effect on Salmonella prevalence by feeding sows meal or pelleted feed.

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Abstract: The aim of this study was 1: To evaluate the Salmonella reducing effect of feeding meal to sows compared to feeding pellets to sows. 2: To evaluate the effect of the sow feed on the Salmonella shedding of the weaners at approximately 25 kg.

There was no overall serological difference between sows fed meal and sows fed pellets over time. Individually there was a statistically significant drop in serology from blood samples taken in the gestation stables to blood samples taken in the farrowing stables. Meal fed sows experienced a drop of 4 OD% and pelleted fed sows had a drop of 6 OD%. This study did not find a significant difference between the Salmonella level of sows fed meal or sows fed pellets. There was a clear relation between the salmonella level of sows and weaners. Only exotic Salmonella serotypes were found.

Keywords: Serology; vertical transmission, weaners.

Introduction: So far the Salmonella reducing efforts in Denmark have been concentrated on the slaughter pigs. Results from earlier investigations have shown that meal feed may reduce Salmonella prevalence in slaughter pigs. The importance of Salmonella-infected piglets has recently been shown in a survey of Salmonella prevalence in sow herds and the prevalence of finding Salmonella at their purchasers. The same study demonstrated that there is an apparently higher risk of finding Salmonella in pen-samples among piglets, when sows were fed purchased ready-mixed feed. As further Salmonella reduction appears to be available through reducing the shedding of Salmonella from sows, the effect of possible Salmonella-reducing feed has been evaluated in this survey.

Materials and Methods: Data was collected from April 2000 to May 2001. The study was carried out in a 600 sows integrated herd, infected with Salmonella,
including *Salmonella* Typhimurium. The study included 406 sows (35 sow-batches), 200 meal fed and 206 pelleted fed sows. Only 12 batches of weaners, each including 12 pens, from these sows were followed in the weaner units. Here 144 pooled pen samples were taken (72 samples from meal fed and 72 samples from pelleted fed).

Sows were given pellets as control (heat-treated at minimum 81°C and pelleted) and meal feed as intervention (not heat treated nor pelleted). Weaners from meal fed sows were given meal feed, and the weaners from pelleted fed sows pellets.

There were two gestation stables, one was fed meal, and the other was fed pellets. Of 24 sows entering the gestation stalls weekly, 12 was randomly selected for the trial. These sows stayed on meal or pelleted feed throughout the study. There where five farrowing stables. One section in each farrowing stable was used for the trial. The sows were placed restrained in the gestation stables, and in individually boxes in the farrowing stables. Four weaner units participated in this trial. For both sows and weaners there were separate footwear and tools in each section. All sections were managed all in all out and cleaned and disinfected before entering of the next batch.

Blood samples were taken from sows within the first 8 days of entering the gestation stables. At the day before weaning (four weeks postpartum) blood and faecal samples were taken from each sow. The weaners were examined by pooled faecal samples before leaving the weaner units at approximately 9 weeks of age. One pooled sample from each pen (5 x 5 g faeces) was taken.

Blood samples were examined by the Danish mix-ELISA. Faecal samples were examined microbiological according to the NMKL method, including non-selective pre-enrichment, followed by selective enrichment and serotyping.

The effect of diets on sows were evaluated by analysis of variance on individually changes in serology, using feed, sow age, and batch as explanatory variables. Serological results were tested for differences in level between bacteriological positive and negative sows by the Wilcoxon test. *Salmonella* findings from weaners were analysed with the number of positive pens from each batch as a binominal observation using logistic regression with sow batch, feed, and mean serological level in the farrowing stable as explanatory variables.

**Results:** There was no overall difference in serological level between the two groups. Individually there was a small significant drop in serological reaction between the sample taken in the gestation unit and the sample taken in the farrowing stable. The meal fed sows: 4 OD%, pellet fed sows: 6 OD%. This drop was higher for sows with more than 6 in parity.

41 sows out of 406 (all 35 batches) came out with positive faecal samples. 6 different serotypes, all exotic, were isolated. There were 28 (13.6%) positive
Salmonella isolations from meal fed sows (8/17 positive batches) and 13 (6.3%) positive isolations from pelleted fed sows (8/18 positive batches). From weaners there were 14 positive isolations from 144 pens (12 batches). From meal fed weaners there were 10 (13.9%) positive samples (3 positive batches) and from pelleted fed weaners there were 4 (5.6%) positive samples (3 positive batches). The analysis revealed no significant difference in either serological nor bacteriological response. The increased Salmonella prevalence in the meal fed weaners were clearly related to the higher finding of Salmonella in the sows delivering the participating batches. This effect could be described as a doubling of the risk for a weaner pen being Salmonella positive for each 10% increase in sow batch prevalence. (RR=2, CI= 1.1-3.3, p=0.02).

<table>
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<th>Batch</th>
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</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Sows *</td>
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</tr>
<tr>
<td>**</td>
<td>13.0</td>
<td>9.3</td>
</tr>
<tr>
<td>Weaners*</td>
<td>0.42</td>
<td>0.17</td>
</tr>
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</table>

*Share of Salmonella positive faecal samples. ** GM (geometrical mean) OD% for the batch.
Table 1.

A connection between the serological levels and the faecal positivity for the sows could not be found.

**Discussion and conclusion:** The results show a significant but modest individual drop in serology for all the sows participating. There is no overall difference between the two feed groups. There were a higher number of Salmonella positive faecal samples from sows fed meal compared to sows fed pellets. The results can be explained by the batch effect of the farrowing stables. Further, it could be supported by the fact that the pelleted feed was heat-treated and the meal feed was not. The lack of a connection between serology and bacteriology in this study could be connected to the finding of only exotic Salmonella serotypes. No *Salmonella Typhimurium* was isolated. So far one has to conclude that there is no apparent reduction in Salmonella shedding from sows fed meal feed compared to sows fed pellets. The results need further investigation.