The role of the infection status of sows on the assignment as Salmonella risk farm in the Belgian Salmonella control program.

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Abstract

Salmonella surveillance and control programs are generally based on results of samples taken from the fattening pigs and intervention measures are limited to the fattening unit. To evaluate the role of the sows in the assignment as Salmonella risk herd we compared the serological status from sows at risk herds to the status of sows at non-risk farms. From this study it is clear that the role of the sows and their serological Salmonella status is a potential influencing factor for the assignment of Salmonella risk farms in the Belgian Salmonella control program, which is principally based on sampling of fattening pigs.

More insight in the role of the sow as a reservoir for Salmonella infections might help to define important intervention measures at pre-harvest stage.

Introduction

Salmonella is considered as one of the most important food borne pathogens that has potential implications for human health (Mao et al., 2003). In a regulation to control Salmonella, the European Commission has set deadlines for its Member States to start Salmonella surveillance programs in the different livestock species that contribute to the risk of food-borne infections in humans. To control Salmonella at the pre-harvest stage the implementation of a surveillance and control program has been established in the different Member States. Since 2005, the Belgian Federal Agency for the Safety of the Food Chain (FASFC) installed a National Salmonella surveillance and control program in pigs, the Salmonella Action Plan (SAP), which became compulsory by means of a Royal act in July 2007 (Anonymous, 2007). Since July 2007, Belgian pig farms can be assigned as Salmonella-risk farms. Once pig farms are assigned the status of risk farm, they should develop a herd-specific Salmonella action plan in order to improve their status. Assignment is based on serological analysis of blood samples collected from the fattening pigs.

This study was conducted to evaluate the serological status of the sows on Salmonella risk farms compared to non-assigned herds.

Materials and methods

With a four month interval, every Belgian pig farm needs to collect blood samples from 12 fattening pigs for the National Aujeszky-disease screening program. Since 2005 these samples are also used for the National Salmonella surveillance and control program. All samples are analyzed using an indirect LPS-Salmonella ELISA (Idexx Laboratories, HerdChek* Swine Salmonella Antibody Test Kit). Since July 2007, risk farms are identified as farms with a mean S/P-ratio, from 12 fattening pigs, equal or higher than 0.6 for 3 successive sampling rounds.

For this study blood samples (n = 1138) of sows were collected on 100 different farrow-to-finish herds. 583 samples were obtained from 50 Salmonella risk farms and 555 samples were obtained from non-risk farms. Risk farms were identified as farms with a mean S/P-ratio equal or higher than 0.6 for 3 successive sampling events. Non-risk farms were defined as farms with a mean S/P-value lower than 0.2 for 3 successive sampling events.
A statistical analysis (Mann–Whitney–Wilcoxon test) was performed to compare the mean S/P ratio in both sow groups.

Results

Table 1. Mean S/P-value ± SEM

<table>
<thead>
<tr>
<th></th>
<th>Number of sows</th>
<th>Mean S/P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk-farms</td>
<td>583</td>
<td>1,138 ± 0.026 SEM</td>
</tr>
<tr>
<td>Non-risk-farms</td>
<td>555</td>
<td>0,702 ± 0.021 SEM</td>
</tr>
<tr>
<td>Total</td>
<td>1138</td>
<td>0,925 ± 0.018 SEM</td>
</tr>
</tbody>
</table>

The results in Table 1 show that the mean S/P ratio obtained from the sows of the Salmonella risk-farms (1.138 ± 0.026 SEM) was significantly higher ($P < 0.0001$) compared with the non-risk farms (0.702 ± 0.021 SEM). The mean S/P-ratio for the 1138 sows was 0.925 ± 0.018 SEM.

Table 2. Number of positive sows with different cut-off values

<table>
<thead>
<tr>
<th>Cut-off mean S/P-value</th>
<th>Risk-farm</th>
<th>Non-risk-farm</th>
<th>Total</th>
<th>%Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>0,1</td>
<td>576</td>
<td>519</td>
<td>1095</td>
<td>96,2</td>
</tr>
<tr>
<td>0,6</td>
<td>446</td>
<td>276</td>
<td>724</td>
<td>63,6</td>
</tr>
<tr>
<td>1</td>
<td>307</td>
<td>117</td>
<td>424</td>
<td>37,3</td>
</tr>
<tr>
<td>1,5</td>
<td>160</td>
<td>44</td>
<td>204</td>
<td>17,9</td>
</tr>
<tr>
<td>2</td>
<td>67</td>
<td>14</td>
<td>81</td>
<td>7,1</td>
</tr>
</tbody>
</table>

In this study there was a presence of Salmonella antibodies in 98.7% of the sows. Table 2 shows that with a cut-off of 0.6 we found 63.6% of the sows to be positive.

Discussion

Sows play an important role in the maintenance of Salmonella infections in farrow-to-finish herds (Nollet et al., 2005). The increasing number of sows on a farrow-to-finish farm was recently identified as a risk factor associated with higher average S/P-values on a farm (Hautekiet et al., 2007). In this study we could clearly show that the infection status of the sows plays a significant role in the assignment as a Salmonella risk farm in the Belgian Salmonella control program, which is based on sampling of fattening pigs. Control of Salmonella on farrow-to-finish herds is now almost only done by implementing measures in the fattening unit. It is clear that further studies are needed to evaluate intervention measures in the sow unit. Vaccination could be one of these intervention options. The fact that Salmonella antibodies were detected in 98.7% of the sows means that practically all sows are potential shedders of Salmonella in the environment and in the slaughterhouse. These are important data for policymakers when implementing national control programs for Salmonella. Slaughterhouses should also be aware of the high risk of Salmonella-contamination when processing sows.

Conclusion

This study showed a significantly higher mean S/P-value in sows from Salmonella risk-farms compared to sows from non-risk-farms. Therefore it is clear that the role of the sows and their serological Salmonella status is a potential influencing factor for the assignment of Salmonella risk farms, which is principally based on sampling of fattening pigs.
References

ANONYMOUS, Royal Act 27 april 2007