Role of wild birds in the epidemiology of infection in an outdoor pig farm in the United Kingdom.

A. De Lucia\(^1\), A. Rabie\(^2\), F. Martell\(^2\), R. Smith\(^3\) F.Ostanello\(^4\) and R. Davies\(^5\).

Introduction

In the European Union in 2015, 13% of the strong evidence foodborne outbreaks caused by Salmonella were attributable to the consumption of pork and pork products. Salmonella contamination of retail pork is directly linked to the Salmonella prevalence on farm. In UK, approximately 40% of breeding pigs are kept outdoors. In outdoor and organic farms, good biosecurity measures are more difficult to apply. The role of wild birds in the Salmonella epidemiology on farm is still unclear, in terms of potential hazard to animals but also for human health.

Aim

To investigate the role of wild birds in the Salmonella epidemiology in one outdoor pig farm in United Kingdom

Material and Methods

- Three farms visits, at times determined by pig farm depopulation, were made in a farm consisting of two adjacent fields, one left empty for more than 2 years and one occupied by pigs during the first farm visit only.
- Environmental samples and wild birds dropping samples were collected at each visit. Pig faeces were collected at the first visit only.
- Salmonella was isolated according to ISO 6579-1:2017.
- Serotypes were determined for a selection of isolates according to the White-Kaufmann-Le Minor scheme. For each farm visit, a selection of representative samples for S. Typhimurium and S. Typhimurium serovar 4,[5],12:- were further characterized by phage typing.
- Quantitative analysis was performed on a random selection of positive samples.

Results

<table>
<thead>
<tr>
<th>Field</th>
<th>Sample type</th>
<th>Area sampled</th>
<th>No. positives</th>
<th>Area of tested (%)</th>
<th>Count (CFU/g)</th>
<th>Serotype</th>
</tr>
</thead>
<tbody>
<tr>
<td>Visit 1</td>
<td>Individual samples</td>
<td>Bird dropping</td>
<td>1/10 (10%)</td>
<td>Typhimurium (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field 1</td>
<td>Environmental samples</td>
<td>Bird dropping</td>
<td>1/10 (10%)</td>
<td>Typhimurium (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field 2</td>
<td>Environmental samples</td>
<td>Bird dropping</td>
<td>1/10 (10%)</td>
<td>Typhimurium (1)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Field 3</td>
<td>Environmental samples</td>
<td>Bird dropping</td>
<td>1/10 (10%)</td>
<td>Typhimurium (1)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

During the first farm visit Salmonella was isolated from:
- 73.1% of the weaners' samples (57 of 78) and 93.3% of the growers' samples (51 of 55) (77 of 77).
- 58.3% (35 of 60) of the environmental samples.
- 7.4% (2 of 27) of the wild birds droppings.

Salmonella CFU/gram
- High levels of Salmonella were found in individual pig faecal samples up to (10^5 CFU/g).
- Low level of Salmonella was found in environmental samples (1-10 CFU/g or 10-10^2 CFU/g) and in the 2 of the positive wild bird droppings (1-10 CFU/g).

During the second farm visit, Salmonella was isolated from:
- 26.9% (36 of 134) of environmental samples.
- 12.5% (12 of 76) of wild birds droppings.

Salmonella CFU/gram
- Low level of Salmonella was found in environmental samples (1-10 CFU/g or 10-10^2 CFU/g).
- Unusually high Salmonella levels were found in bird dropping (up to 10^5 CFU/g).

Conclusion

Pigs are the likely source of Salmonella infection in wild birds. Wild birds are likely recycling the infection and contributing to the persistence of Salmonella between batches of pigs.

Discussion

Interestingly, the proportion of Salmonella-positive wild bird droppings increased over time by 7.4%, 24.6% and 44.3% at the first, second and third visit, respectively. The levels of Salmonella identified in some of the wild bird droppings were unusually high (10^-10 CFU/g) suggesting that Salmonella was actively replicating in the gastrointestinal tract of these birds.

Monophasic Salmonella Typhimurium was the predominant Salmonella isolated, even in wild bird droppings, supporting the hypothesis that the pigs were already the original source of infection, as this serovar is typically associated with pig production and is not normally found in wild birds that are not exposed to other infected species.

The pig farm sampled in this study is adjacent to a water course and a wild bird reserve. This could have impacted on the epidemiology of infection and persistence of Salmonella. Further farms should be sampled to gather more evidence on the role of wild birds in outdoor pig production.