Introduction and Objectives

*Mycoplasma hyopneumoniae* (Mh) is considered the primary infectious pathogen associated with enzootic pneumonia in pigs. The disease has a universal distribution and causes important economic losses in modern swine industry due to reduced growth rate, poor feed conversion and increased susceptibility to infection by other organisms (1). The aim of the present study was to quantify the transmission of Mh during the nursery period, expressed as an adjusted reproduction ratio ($R_n$), and to compare possible differences in transmission between high and low virulent strains of Mh (2).

Materials and Methods

Forty-eight Mh and PRRSV-free piglets of 3 weeks old were randomly allocated to 6 pens. Each group was housed in a room equipped with absolute filters and consisted of 2 intratracheally inoculated (7×10$^7$ CCU of a Mh isolate in 7ml inoculum) and 6 susceptible pigs. In 3 pens, the seeder pigs were inoculated with a high virulent isolate, in the other 3 pens with a low virulent isolate (2). Pigs were observed daily during 6 weeks, namely from 4 until 10 weeks of age, corresponding with the nursery period as commonly observed in Europe. Body condition, appetite, dyspnoea and tachypnoea and coughing were scored daily. Blood samples were taken at arrival and at 23, 32 and 43 days post inoculation (DPI) to detect antibodies against Mh. Forty-three DPI, all piglets were euthanized and pneumonic lesions were quantified using IF, histology and bacteriological investigations were performed on each lung. The percentage of lung area occupied by air (percentage air) was examined using an imaging analysis system and the severity of peribronchiolar and perivascular infiltration and nodule formation was scored. Tracheobronchiolar washing was performed to detect the presence of Mh organisms with a nPCR-test (4).

Transmission of Mh was quantified using an adjusted reproduction ratio ($R_n$), which was defined as the mean number of contact infections arising from one typical infectious animal during the study period. The $R_n$ was calculated following the maximum likelihood estimation based on the distribution of the final size of the experiments (5).

Results and Discussion

All inoculated animals were found positive for Mh at the end of the study period. The distribution of contact infected animals is shown in Table 1. Animals were considered to be infected when nPCR on tracheobronchiolar washing was positive. More animals got infected in the high virulent groups, resulting in a higher $R_n$. The calculated $R_n$ (95% CI) was 1.47 (0.68 - 2.71) for the high virulent isolate and 0.85 (0.33 - 1.66) for the low virulent isolate. This means that a piglet infected with the high virulent isolate will infect on average 1.47 pen mates during the nursery phase. Since confidence intervals of both groups overlap, the difference was not significant and an overall $R_n$ was: 1.16.

Piglets started to cough on average at 15.0 DPI, while pigs in high and low virulent groups started to cough on average at 12.6 DPI (from 4 to 28 DPI) and 17.3 DPI (from 7 to 31 DPI), respectively. Seroconversion was seen in 87% of inoculated piglets from the high virulent group, and in 67% of the animals of the low virulent group at 43 DPI. Animals infected in the high virulent group showed a faster seroconversion after inoculation. Lung lesion scores of the inoculated animals were 8.50 in the high virulent group, and 1.93 in the low virulent group. The average lesion score for the high virulent group was 2.59 and 0.62 for the low virulent group. 5/6 and only 1/6 inoculated animals were found positive by IF in the high vs. low virulent group. Percentage air, peribronchiolar and perivascular infiltration and nodule formation was not significantly different between both groups.

Table 1: Number of contact infected animals.

<table>
<thead>
<tr>
<th>Pen</th>
<th>High virulent Mh groups</th>
<th>Low virulent Mh groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2/6</td>
<td>3/6</td>
</tr>
<tr>
<td>2</td>
<td>5/6</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>2/6</td>
<td>2/6</td>
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<tr>
<td>4</td>
<td>2/6</td>
<td>2/6</td>
</tr>
</tbody>
</table>

There was a trend of a lower spread of Mh during the nursery phase in animals infected with a low virulent isolate compared to animals infected with a high virulent isolate. It is important that the combined $R_n$, under our laboratory circumstances, is only slightly larger than 1, meaning that the infection can spread in nursery pigs, but in most cases, the spread will be limited. Although transmission was not intensive in our experiments, it cannot be excluded that adverse management practises, overcrowding or concurrent infections would be able to stimulate the transmission of Mh. In conclusion, based on this experiment, Mh organisms slowly spread to pen mates during a 6-week nursery period.

References