Infections are the most common cause of bovine abortion. Here we report recent diagnostic findings in bovine abortion material from Denmark, a country with a large dairy sector and high animal health standards. This study was conducted in order to gain in-depth knowledge on infectious causes of abortions i.e. to identify and localize infective agents in placental and foetal tissues. The cultivation-independent methods Fluorescence in situ hybridization (FISH) and second generation sequencing were applied additionally to routine histopathology and bacterial cultivation.

STUDY POPULATION

0.8% of reported abortions during study period

Figure 1. The study population consisted predominantly of dairy cows (5% beef) from mainly conventional farms (4% organic) and originated from across the country matching the geographical distribution of dairy farms in Denmark (map displaying dairy farms as grey dots and abortion submitting farms as red dots). The majority of the abortions took place during mid to late gestation.

SAMPLE MATERIAL

SECOND GENERATION SEQUENCING

DNA was extracted from placenta, a liver and lung pool as well as kidney. Part of the total bacterial DNA per sample was amplified using universal bacterial primers binding adjacent to the variable regions V1 and V2 of the 16S rRNA gene. The resulting amplicon was sequenced on the Illumina MiSeq platform.

Figure 5. DNA was extracted from placenta, a liver and lung pool as well as kidney. Part of the total bacterial DNA per sample was amplified using universal bacterial primers binding adjacent to the variable regions V1 and V2 of the 16S rRNA gene. The resulting amplicon was sequenced on the Illumina MiSeq platform.

RESULTS

FISH

In Table 1, all isolates detected were also visualized by in situ hybridization (FISH) and are presented as number and percentage of abortions.

Table 1. Bacterial genera/species isolated using routine aerobic cultivation.

<table>
<thead>
<tr>
<th>Species</th>
<th>n</th>
<th>Genus/Species</th>
<th>n</th>
<th>Genus/Species</th>
<th>n</th>
<th>Genus/Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Escherichia coli</td>
<td>37</td>
<td></td>
<td>2</td>
<td>Listeria monocytogenes</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Acinetobacter spp.</td>
<td>15</td>
<td></td>
<td>6</td>
<td>Vibrio spp.</td>
<td>3</td>
<td>Morganella morganii</td>
</tr>
<tr>
<td>Aerococcus spp.</td>
<td>13</td>
<td></td>
<td>5</td>
<td>Veccococcus spp.</td>
<td>3</td>
<td>Pasteurella agglomerae</td>
</tr>
<tr>
<td>Proteus spp.</td>
<td>13</td>
<td></td>
<td>5</td>
<td>Lactobacillus spp.</td>
<td>2</td>
<td>Pasteurella spp.</td>
</tr>
<tr>
<td>Lactobacillus spp.</td>
<td>9</td>
<td>Bacillus licheniformis</td>
<td>5</td>
<td>Klebsiella spp.</td>
<td>2</td>
<td>Serratia fonticola</td>
</tr>
<tr>
<td>Enterococcus spp.</td>
<td>8</td>
<td>Hafnia alvei</td>
<td>6</td>
<td>Citrobacter spp.</td>
<td>1</td>
<td>no bacteria isolated</td>
</tr>
</tbody>
</table>

n = number of abortions from which genus/species was isolated

Figure 6. Distribution of organ lesions diagnosed in HE tissue sections shown as number and percentage of abortions.

CONCLUSIONS

- Neosporosis was the most frequently diagnosed infection.
- No epizootic abortifacients were found on study population level, however, due to very few abortions submitted per herd, no conclusions can be drawn on herd level.
- Fungi seem to play a minor role as abortogenic agent in Denmark.

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