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Bovine Abortions and Stillbirths in Denmark 2015 to 2017

Godelind A. Wolf-Jäckel, DVM, PhD-student; M.S. Hansen, G. Larsen, E. Holm, T.K. Jensen

**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 infectious 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**

![Map of Denmark depicting dairy farms](https://i.stack.imgur.com/J80iz.jpg)

Figure 1. The study population consisted predominantly of dairy cows (5% beef) from mainly conventional farms (9% 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**

![Diagram of organs](https://i.stack.imgur.com/50xH.png)

Figure 2. Organs collected at necropsy for histological and molecular analyses. Organs were chosen based on known predeliction sites for abortogenic infections (e.g. neosporosis in brain, liver, heart; Leptospira intermedia in kidneys) and related to potential ports of entry into the foetus. Abortion material was submitted to DTU Vet for routine abortion diagnostics from January 2015 until June 2017.

**RESULTS**

**BRUCELLA ABORTUS CULTIVATION**

All foetal organ pools were negative for *Brucella abortus*.

**HISTOPATHOLOGICAL SCREENING FOR NEOSPORA CANINUM**

Neosporosis was diagnosed in 30 out of 162 abortions (19%) based on findings in HE stained tissue sections of brain, heart, and liver.

**ELISA**

In 90% of the cases, a blood sample of the dam was submitted. All samples were negative for maternal BVDV antibodies.

**SECOND GENERATION SEQUENCING**

<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>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
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<td>Listeria</td>
<td>7</td>
<td>Listeria</td>
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<td>Vibrio</td>
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<td>Morganella</td>
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<tr>
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<td>Veccococcus</td>
<td>5</td>
<td>Veccococcus</td>
<td>3</td>
<td>Pantonia</td>
<td>1</td>
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<tr>
<td>Proteus</td>
<td>13</td>
<td>Streptococcus</td>
<td>5</td>
<td>Streptococcus</td>
<td>2</td>
<td>Pasteurella</td>
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<tr>
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<td>Bacillus</td>
<td>5</td>
<td>Bacillus</td>
<td>2</td>
<td>Serrata</td>
<td>1</td>
</tr>
<tr>
<td>Emerococcus spp.</td>
<td>8</td>
<td>Hafnia</td>
<td>5</td>
<td>Hafnia</td>
<td>1</td>
<td>no bacteria</td>
<td>30</td>
</tr>
</tbody>
</table>

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

**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.